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ESL-TR-87-44

MONITORING OF TEST SECTIONS DESIGNED TO REDUCE REFLECTION CRACKING

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JANUARY 1989

FINAL REPORT

SEPTEMBER 1986 — SEPTEMBER 1987

AFESC

ENGINEERING & SERVICES LABORATORY
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SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release. Distribution unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NMERI WA5-13 (.5.13)	5. MONITORING ORGANIZATION REPORT NUMBER(S) ESL-TR-87-44
6a. NAME OF PERFORMING ORGANIZATION New Mexico Engineering Research Institute 6b. OFFICE SYMBOL (If applicable) NMERI	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State and ZIP Code) Box 25, University of New Mexico Albuquerque, New Mexico 87131	7b. ADDRESS (City, State and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Engineering and Services Laboratory 8b. OFFICE SYMBOL (If applicable) RDCP	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER Contract F29601-84-C-0080
8c. ADDRESS (City, State and ZIP Code) Air Force Engineering and Services Center Tyndall Air Force Base, Florida 32403	10. SOURCE OF FUNDING NOS. PROGRAM ELEMENT NO.: 63723F PROJECT NO.: 2104 TASK NO.: 10 WORK UNIT NO.: 35

11. TITLE (Include Security Classification)
MONITORING OF TEST SECTIONS DESIGNED TO REDUCE REFLECTION CRACKING

12. PERSONAL AUTHOR(S)
R. Gordon McKeen and Raymond D. Pavlovich

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Yr., Mo., Day)	15. PAGE COUNT
Final Report	FROM 9/86 TO 9/87	January 1989	178

16. SUPPLEMENTARY NOTATION
Availability of this report is specified on reverse of front cover.

17. COSATI CODES

FIELD	GROUP	SUB. GR.
01	05	
13	02	

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Reflection Cracking
Interlayers
Fabrics
Asphalt-Rubber

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Several pavement test sections incorporating designs intended to retard the development of reflective cracking in pavement overlays were monitored and performance evaluations were made. Performance assessments involved test pavements at Kirtland AFB, Williams AFB, Coolidge Municipal Airport, and Peterson AFB. The specifications for stress-absorbing membrane interlays (SAMIs) are also reviewed and recommendations for future use are provided.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS ☐	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL Capt Michael J. Coats	22b. TELEPHONE NUMBER (Include Area Code) Autovon 970-6317 22c. OFFICE SYMBOL HQ AFESC/RDCP

DD FORM 1473, 83 APR EDITION OF 1 JAN 73 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

PREFACE

This report was prepared by the New Mexico Engineering Research Institute (NMERI), Box 25, Albuquerque, New Mexico 87131, under Contract F29601-84-C0080, for the Air Force Engineering and Services Center, Engineering and Services Laboratory (AFESC/RDCP), Tyndall Air Force Base, Florida, 32403.

This report summarizes work done between September 1986 and September 1987. HQ AFESC/RDCP Project Officers were Mr. James Murfee, Ms. Patricia C. Suggs, and Major Mike Koch.

This report has been reviewed by the Public Affairs Office (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS it will be available to the general public, including foreign nationals.

This technical report has been reviewed and is approved for publication.

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CONVERSION TABLE

To convert from	To	Multiply by
inch (in)	millimeter (mm)	25.4
inch (in)	centimeter (cm)	2.54
foot (ft)	meter (m)	0.3048

SECTION I
INTRODUCTION

A. OBJECTIVE

The objective of this work was to monitor several pavement test sections incorporating designs intended to retard the development of reflection cracking to improve field performance of airfield pavements.

B. BACKGROUND

Rehabilitation of pavements by placing asphalt overlays is a well-established procedure for improvement of aged pavements. Application of various treatments to existing pavements before overlay was intended to prevent or delay the appearance of cracks in the new overlay. This sort of cracking is usually referred to as reflection cracking because it reflects the original cracking pattern in the underlying pavement. Most of the development leading to the use of treatments had been carried out by agencies that construct and maintain highway pavements.

Recognizing the potential benefits of asphalt-rubber mixtures in rehabilitation and maintenance of pavement systems, the Air Force Engineering and Services Center (AFESC) initiated a technology review of the material in April 1977 (Reference 1). Two of the conclusions made in that study were:(1) that asphalt-rubber mixtures seem promising in the prevention of reflection cracking, and (2) that asphalt-rubber interlayers should be investigated in conjunction with conventional asphalt-concrete overlays.

As a result of that study, further investigations were carried out to develop specifications for use of asphalt-rubber materials as interlayers on airfield pavements. Experimental pavements were constructed at Kirtland AFB, New Mexico, Williams AFB, Arizona, and Coolidge Municipal Airport (used as an auxiliary training site by the Air Force), Arizona. These pavements were evaluated to measure performance of the materials used at each site.

A designed experiment was proposed in 1985 for a rehabilitation project at Peterson AFB, Colorado. In this case, the experiment included other techniques for retarding reflection cracking in addition to asphalt-rubber. This pavement was the fourth field experiment included for monitoring under the present study.

References 1, 2, 3, and 4 are previous reports produced on this topic.

Reference 1 provided the guidance that asphalt-rubber showed promise as a material for use in interlayers between old pavements and new overlays on airfields. Reference 2 was an extensive laboratory study of the properties of asphalt-rubber mixtures and methods of testing the material to provide useful tests for specifying asphalt-rubber in construction contracts. An experimental pavement was constructed at Kirtland AFB as part of the evaluation of the proposed guide specification. Reference 3 was an interim report on the monitoring of performance of the Kirtland AFB experimental pavement and reported on the construction of two additional test sections located in Arizona (Williams AFB and Coolidge Municipal Airport). Reference 4 is the final report on the effort and contains all the information in Reference 3, plus additional information on the construction monitoring and testing at Williams AFB and Coolidge airport. These latter test pavements were not designed experiments. The Air Force had construction projects underway involving the construction of a stress-absorbing membrane interlayer (SAMI) prior to overlaying the two runway pavements involved. Monitoring consisted of documenting the development of cracking in the overlays and making comparisons to the original cracking in the test section. Reference 4 also includes the construction documentation for a designed experiment located at Peterson AFB. In this experiment several methods of reducing reflective cracking in overlays were included in addition to asphalt-rubber. Because the opportunity existed to prepare specifications and work with the base from the development of the contract documents, the experiment is well-conceived and designed. All results have statistical significance and should prove to be valuable to the reader.

C. SCOPE

The current study assessed of the performance of test pavements located at Kirtland AFB, Williams AFB, Coolidge Municipal Airport, and Peterson AFB. The current guide specification for SAMIs was reviewed and recommendations for its further use provided. An evaluation of other methods of retarding reflective cracking (used at Peterson AFB) is reported in relation to the performance of asphalt-rubber.

SECTION II

KIRTLAND AFB, APRON A FIELD TRIAL

Apron A at Kirtland AFB was rehabilitated in November 1981 by placing an overlay on an existing asphalt-concrete pavement. Prior to release of the plans for bids the New Mexico Engineering Research Institute (NMERI) prepared an experimental plan that included several mix parameters as variables, as well as two different control sections. The objective was to compare the performance of various materials to determine if changes in the guide specification should be made, based on field performance.

The original apron was constructed in the 1940s and consisted of an asphalt concrete pavement approximately 3.8 cm (1.5 inches) thick, over a sand base. It was badly deteriorated due to environmental conditions and exhibited extensive cracking. Information on the preconstruction condition and documentation of the construction work is included in previous reports, References 2 and 3. The reconstruction involved the variables illustrated in Table 1.

Condition evaluations were performed by measuring the length of cracking in the overlay at various intervals of time after construction. These were expressed as a cracking index which was obtained by dividing the length of cracking by the area which resulted in an index with units of length to the -1 power, which was then multiplied by 10,000 to provide a convenient number. Due to the extensive and closely spaced cracking before construction, no comparison to preconstruction cracking could be made.

This work included evaluations in September 1986 and in June 1987. The earlier evaluation consisted of crack measurements and the coring of several locations. The evaluation in June consisted of a pavement condition survey only. Figure 1 shows a plot of overall average cracking on the apron versus time. It is concluded from these data that the new overlay exhibited cracking after about 2 years of age. The cracking continued to increase up to 3.5 years and then stabilized. The condition of all sections on the apron is excellent as of June 1987. Differences between sections were

TABLE 1. EXPERIMENTAL SECTIONS--APRON A

Section Code	Rubber Type	Mix Time (min)	Surface Preparation	Area (ft^2)	Remarks
Control I	NA	NA	NA	46750	14 cm AC[a] (5.5 in)
Control II	NA	NA	H/S[b]	46750	7.6 cm AC (3.0 in) (1.5 in H/S)
3-3-1	CPR-10P	160	H/S	22500	
3-3-2	CPR-10P	160	SS[c]	3000	
3-2-1	CPR-10P	60	H/S	22500	
3-2-2	CPR-10P	60	SS	3000	
3-1-1	CPR-10P	15	H/S	22500	
3-1-2	CPR-10P	15	SS	3000	
2-3-1	C-104	160	H/S	22500	
2-3-2	C-104	160	SS	3000	
2-2-1	C-104	60	H/S	22500	
2-2-2	C-104	60	SS	3000	
2-1-1	C-104	15	H/S	22500	
2-1-2	C-104	15	SS	3000	
1-3-1	TP044	160	H/S	22500	
1-3-2	TP044	160	SS	3000	
1-2-1	TP044	60	H/S	22500	
1-2-2	TP044	60	SS	3000	
1-1-1	TP044	15	H/S	22500	
1-1-2	TP044	15	SS	3000	

[a]AC = asphalt-concrete
[b]H/S = heater scarified
[c]SS = slurry sealed

Note: Section designations have the following meanings: first digit is rubber type, 1-TP044, 2-C104, 3-CPR-10P; second digit is mix time in minutes, 1-15, 2-60, 3-160; third digit is surface preparation, 1-H/S, 2-SS.

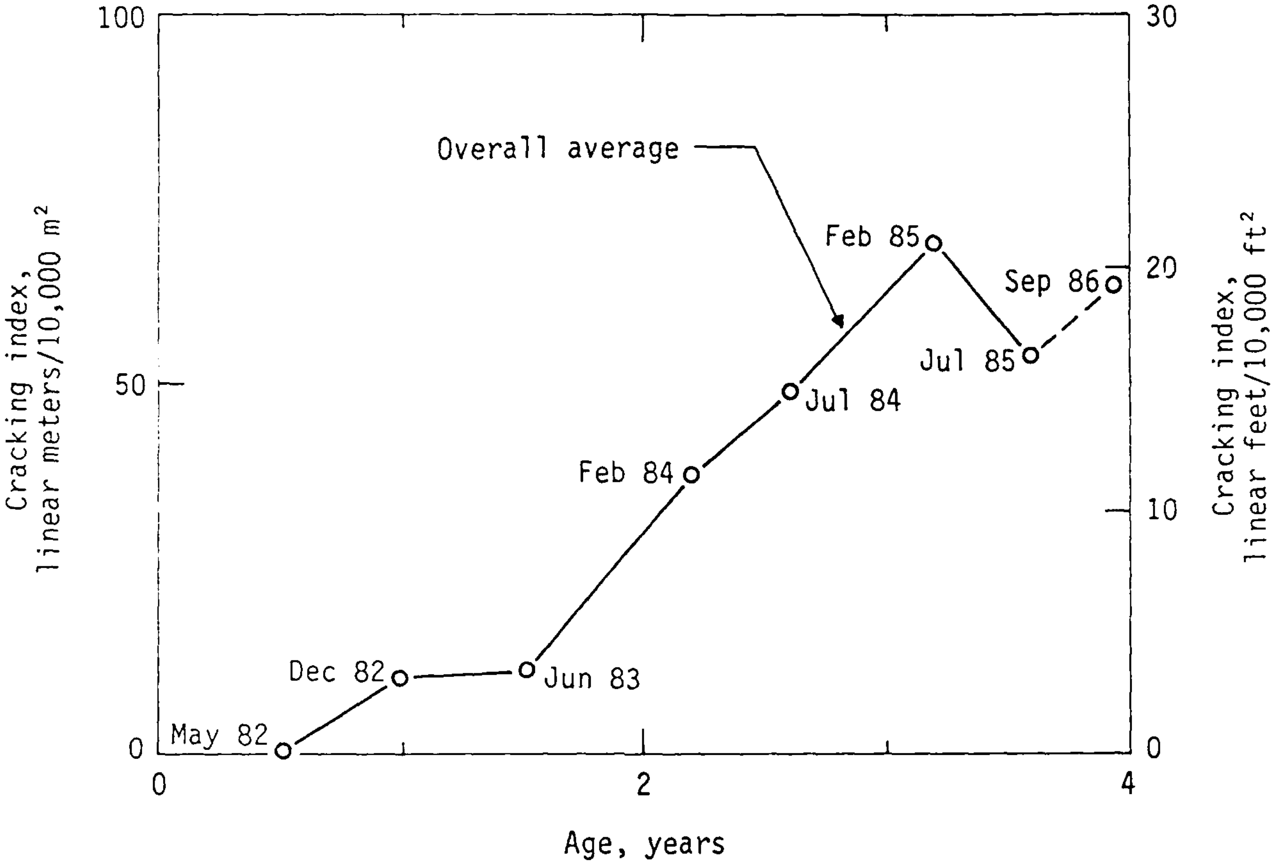

Figure 1. Cracking Index Data for Apron A.

examined in earlier studies and found to be not significant with the exception of two observations at specific ages. These indicated that Control Section I was cracking more severely at certain ages than all other sections. This was due to fuel truck traffic using the pavement and did not relate to the material characteristics. At certain ages it was apparent that the long-mix-time material was cracking at a higher rate than shorter mix time materials. Since these observations were at early ages it is not certain that this trend would lead to deterioration of those sections at an earlier stage. Since the current guide specification already includes a limitation on mixing time, there does not appear to be any indication of a need for modifying the existing guide specification based on the experience from Apron A.

Cores taken at the earlier evaluation were primarily intended to indicate whether the cracking in the overlay went all the way through the pavement and whether the asphalt-rubber membrane provided a seal. Inspection of cores taken indicated that the asphalt-rubber membrane was intact and provided a seal for the cracking that occurred on Apron A.

Because the cracking index stabilized for the last 2 years no crack count was made in the last inspection. The condition has not changed since the crack count was made in September 1986. Based on the inspection of the pavement in June 1987 no new cracking is evident and the condition is still excellent.

SECTION III
WILLIAMS AFB AND COOLIDGE AUXILLARY FIELD

Sections of the runways at Williams AFB and Coolidge Auxillary Field were set up for use as test sections to study the reflection cracking in the overlay pavement as a function of age. No experimental design for these sites was possible because the contracts for construction were already out for bids before NMERI became involved in the work. The preconstruction cracking was documented and used for comparison to the subsequent cracking occurring in the overlay. Each test section was 45.7 by 45.7 meters (150 by 150 feet).

The Williams AFB test section was located on the north end of runway 12L-30R, 83.8 meters (275 feet) south of the portland cement concrete (PCC) runway end. About two-thirds of the test section was milled from a 0- to 0.6-cm (0.25-inch) depth as part of the transition to the PCC runway end. The SAMI was placed in 12 passes starting at the west pavement edge, going north, and then alternating across the width of the runway. A total of seven batches of material were prepared. Construction of the SAMI proceeded as planned and no significant deviation from the contract specifications was observed. Construction at Williams AFB took place December 13, 14, and 15, 1983.

The Coolidge Field test section was laid out in the interior of runway 5-23. An attempt was made to seal the cracks prior to SAMI placement using a CSS-1 asphalt emulsion. This was then covered with sand, resulting in a very dirty surface for placement of the overlay material. A total of eight batches of material was prepared, being placed in 12 passes. Construction at Coolidge Field took place January 18, 19, and 20, 1984.

Pavement evaluations have consisted of measuring the length of cracking in the overlay and computing the percent of original cracking that has reappeared in the overlay. The two evaluations completed for this study are shown along with previous data in Figure 2. It is clear that Coolidge Field exhibited significant percent return of cracking within the first year. The rate of cracking is continuing to remain high and as of the June 1987 evaluation exceeds the original cracking in the pavement. The Williams site

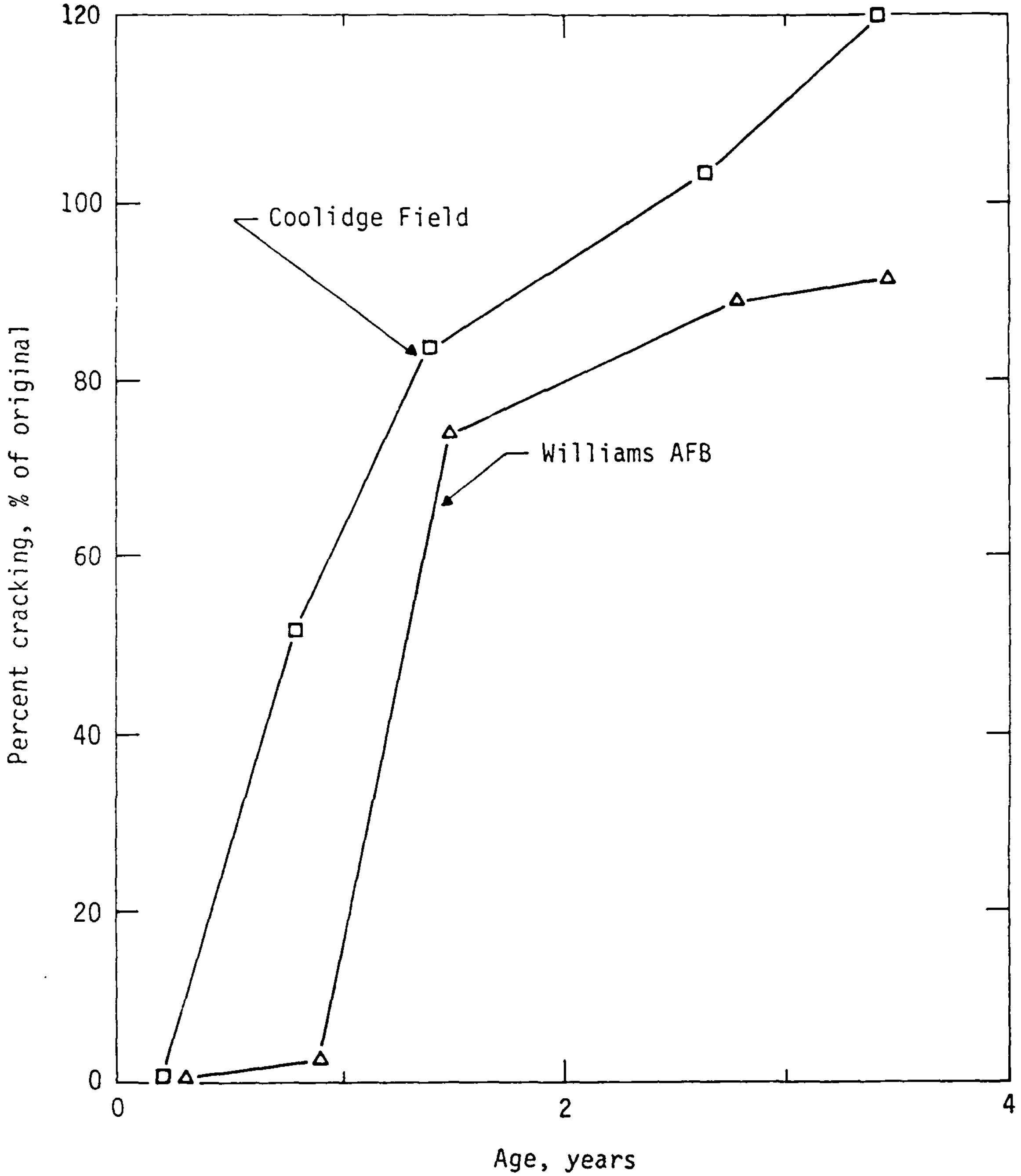

Figure 2. Percent Cracking Data for Arizona Sites.

on the other hand exhibited cracking at about 1 year of age and subsequently stabilized below 100 percent of the preconstruction cracking. Several factors may have contributed to this result.

First, the pavement section at Coolidge is not as thick as Williams, consisting of 2 inches of field-mixed AC with a 1.5-inch overlay. The Williams pavement consists of a 4-inch mat of plant-mixed AC. The base at Coolidge is a total of 9 inches versus 14 for the Williams pavement. Since the aircraft using each facility are similar, it is concluded that pavement loading directly influences the rate and the amount of cracking in the overlay. This raises the point that asphalt-rubber membranes do not provide any additional structural capacity for the pavement. It also clearly indicates that structural differences in pavements can make a significant difference in rate of cracking after construction. Some measurements of the deflection under load would provide a valuable way to compare the two pavements to indicate whether the structural capacity is allowing vertical displacements which cause the cracking.

Second, the crack filling operation at Coolidge was far less satisfactory than work done at Williams. Excessive amounts of sand and crack sealer (CSS-1 emulsion) were on the surface when the paving took place. The preparation of the surface may have contributed to the difference in performance at the tw. sites. However, there is no way to further investigate this question.

SECTION IV
PETERSON AFB FIELD TRIAL

A. OBJECTIVE

The objective of the study was to evaluate performance of various materials used to delay or prevent reflective cracking in asphalt concrete overlays over portland cement concrete or soil cement bases.

B. SCOPE

Two base types were included in the study. One base material was conventional jointed portland cement concrete and the other was a badly cracked soil cement base.

Both base materials had been previously overlayed with asphalt or tar concrete and both badly cracked overlays were removed by milling before placement of the experimental materials.

Study variables included:

- Asphalt-rubber stress absorbing membrane interlayers (SAMIs).
- Polymer modified asphalt-rubber stress absorbing membrane interlayers (SAMIs).
- Fabric interlayers.
- Rubber-filled asphalt concrete (RFAC).
- Conventional asphalt concrete with joints sawed at the same location as joints in the underlying portland cement concrete.
- Sawed joints were not used in trial sections on soil cement bases.
- Control (conventional asphalt-concrete without interlayers).

Interlayers consist of thin layers of low modulus (stiffness) materials placed between the base and asphalt concrete overlay. Rubber-filled asphalt-concrete consists of an overlay of gap graded asphalt-concrete with reclaimed rubber filling the gap. Control sections consist of conventional asphalt-concrete.

Two experiments were included in the study. One considered performance over jointed portland cement concrete and the other considered performance for soil cement bases. The project test matrix is shown in Table 2.

TABLE 2. PROJECT TEST MATRIX

Treatment \ Base	Number of Sections	
	Portland Cement Concrete Base	Soil Cement Base
Control, Asphalt-Concrete	2	2
Asphalt-Rubber (SAMI)	2	2
Modified Asphalt-Rubber (SAMI)	2	2
Rubber-Filled Asphalt-Concrete	2	2
Fabric (Interlayer)	2	2
Sawed Asphalt-Concrete	2	0

Each material was replicated twice to comply with requirements for statistical analysis of performance data. Therefore, the study included 22 test sections with 12 sections on the portland cement concrete base and 10 sections on the soil cement base.

Test sections on the portland cement concrete base are 70 feet wide by 275 feet in length; sections on the soil cement are 70 feet wide by 135 feet long. Length of the test sections was controlled by length constraints available at the facility and the number of materials to be included in the experiment. Asphalt-concrete overlay (or inlay) thickness varies from approximately 2 inches in thickness to 7 inches to accommodate existing drainage swale geometry (see Layout, Appendix A). Existing paving materials were milled to required depth and test materials were appropriately placed in the inlay (Appendex A). Locations of test sections for each replication of each experimental material were selected at random and placed as shown in the appendix.

Construction specifications for each material are included in Appendix B.

C. LOCATION

The study was located at Peterson AFB, Colorado on an apron improvement project. Trial sections were placed on a strip 70 feet wide by approximately 4650 feet long between the Peterson apron and taxiway 12-31. The strip begins (station 0 + 00) at the northwest end of the complex and continues to the existing Air National Guard hangers (station 46 + 50).

Sections on the portland cement concrete base are on the northwest end of the project (stations 0 + 00 to 33 + 00); sections on soil cement base are on the southeast end (station 33 + 00 to 46 + 50). Section layout and monument details are shown in Appendix A.

D. PRECONSTRUCTION DETAILS

The study area consisted of two overall sections with a drainage swale at midwidth along the entire length of the study area. The northwest section consists of an asphalt or tar concrete inlay over a 6-inch portland cement concrete pavement (base) (stations 0 + 00 to 33 + 00). The southeast section consists of asphalt or tar concrete over approximately 6 inches of soil cement (stations 33 + 00 to 46 + 50). Asphalt or tar concrete thickness varies from 1.75 to 6 inches over each base type.

Crack patterns were quite different for each base type. Asphalt- or tar-concrete over the portland cement concrete sections showed uniform block cracking, reflecting joint spacings of the portland cement concrete base. Asphalt- or tar-concrete over the soil cement sections showed random cracking with considerable alligator cracking.

E. CRACK SURVEYS AND PERFORMANCE (CRACKING) EVALUATION

All cracks were mapped to scale and summarized as follows:

1. Cracking in portland cement concrete sections was summarized as linear feet of cracking or jointing. Each 275-foot section was subdivided into 25-foot subdivisions and relative cracking was defined and calculated as linear feet of cracking per square foot of the subdivision.

2. Cracking in soil cement sections was summarized as square feet of cracking. Each 135-foot section was subdivided into two 25-foot and one 35-foot subdivision and relative cracking was defined and calculated as square feet of cracking per square foot of the subdivision.

Forms for performance evaluations (crack counts and location) and spreadsheets for analysis are on file and available on request.

F. TEST SECTION CONSTRUCTION

Construction was under the control of Peterson AFB Civil Engineer. Observations were made by NMERI personnel. Construction milling started on September 6, 1985 and paving was completed on October 12, 1985. Quality control test reports are on file at Peterson AFB and construction photographs are on file at NMERI.

Construction operations were as follows:

1. Bituminous and portland cement concrete milling: September 6-20, 1985.

2. Placement of materials (except rubber-filled asphalt-concrete) with asphalt-concrete inlay: September 25 to October 7, 1985.

3. Placement of rubber-filled asphalt concrete: October 12, 1985.

G. PERFORMANCE EVALUATION DATA

Appendixes C, D, and E include data from crack surveys and reduction and analyses of these data.

Data for portland cement base sections 1-12, sheets 1-6 of 40 consist of:

1. Columns 1 and 2 are stations within the section where crack counts were made.

2. Column 3 is the preconstruction crack count in linear feet of cracking for the particular subdivision.

3. Column 4 is crack count in linear feet of cracking at the time of the survey.

4. Column 5 is crack count in linear feet of cracking at the time of the survey calculated as a percentage of preconstruction cracking.

5. Column 6 is relative cracking. This is calculated as linear feet of cracking for the subdivision as a percentage of the subdivision area and is expressed (for portland cement concrete bases) as lineal feet per square foot.

Data for soil cement base sections 13-22, sheets 7-10 of 40 consist of:

1. Columns 1 and 2 are stations within the section where crack counts were made.

2. Column 3 is the preconstruction crack count in square feet of cracking for the particular subdivision.

3. Column 4 is crack count in square feet of cracking at the time of the survey.

4. Column 5 is crack count in square feet of cracking at the time of the survey calculated as a percentage of preconstruction cracking.

5. Column 6 is relative cracking. This is calculated as square feet of cracking for the subdivision as a percentage of the subdivision area and is expressed (for soil cement bases) as square feet per square foot.

Portland cement concrete base sections summaries and analyses of variance can be found on sheets 11-18 of 40. These analyses include:

- Total cracks
- Relative cracks

- Total cracking expressed as a percentage of total area preconstruction cracking
- Relative cracking expressed as a percentage of subdivision area preconstruction cracking

Soil cement base sections summaries and analyses of v. iance can be found on sheets 19-26 of 40 with the same analyses inclu e or portland cement concrete sections.

Summaries of cracking means and data bases for sorting are on sheets 27-32 of 40.

Plots of the data are on sheets 33-40 of 40.

H. PRECONSTRUCTION CONDITION EVALUATION

Data for preconstruction evaluation are shown in Appendix C.

1. Portland cement concrete sections 1-12, results and discussion.

Preconstruction cracking as expressed by total lineal feet of cracking per section is not uniform throughout the test sections (Reference ANOVA, pages C-12 and C-33 of 40). It appears that the following groupings can be made (based on cracking):

- Sections 4, 1, 5, and 9
- Sections 6, 7, 2, 10, and 11
- Sections 12 and 8
- Section 3

Based on this nonuniformity, it is suggested that evaluations of performance of the treatments be based on analyses of cracking expressed as a percentage of original cracking.

2. Soil cement sections 13-22, results and discussion.

Preconstruction cracking as expressed by square feet of cracking per section is not uniform throughout the test sections (Reference ANOVA, pages C-20 and C-37 of 40). Section groupings appear to be uniform with the exception of Section 13.

Based on this nonuniformity, it is suggested that evaluations of performance of the treatments be based on analyses of cracking expressed as a percentage of original cracking.

I. JULY 1986 EVALUATION (EVALUATION NO. 1)

Data for this evaluation (age approximately 9 months) are shown in Appendix D.

Portland cement concrete base sections. No significant differences between treatments (Reference ANOVA, page D-12 of 40).

Soil cement base sections. Cracking had not progressed to the extent where alligator cracking appeared. Therefore data are shown and analyzed as total lineal feet of cracking. No significant differences between treatments (Reference ANOVA, page D-20 of 40).

J. JUNE 1987 EVALUATION (EVALUATION NO. 2)

Data for this evaluation (age approximately 18 months) are shown in Appendix E.

Portland cement concrete base sections. Sections 6 and 7 (sawed asphalt-concrete) have significantly less total and relative cracking than the other treatments.

Soil cement base sections. Cracking had not advanced to the point where areas of cracking can be measured. Analysis was based on lineal feet of cracking and, at the time of this evaluation, there were no significant differences between treatments.

SECTION V
SUMMARY AND CONCLUSIONS

A. WILLIAMS AFB AND COOLIDGE FIELD

Since neither of these installations used a control section for comparison of reflection crack progression between overlays using asphalt-rubber SAMIs and conventional construction, conclusions regarding the effectiveness of the SAMI cannot be made. In addition, it appears that in some sections on Coolidge more cracks appear in the overlay than existed prior to the overlay, indicating significant deterioration of the pavement structure since placement of the SAMI.

One apparent outcome is that reflection cracks in the experimental sections progress at a slower rate for thicker structural sections.

B. KIRTLAND AFB

After approximately 4 years (nine experimental asphalt-rubber and two control sections) no significant performance differences exist between any of the treatments and the control sections. Therefore, observations should be continued to monitor longer term performance.

C. PETERSON AFB

Sufficient time has not elapsed since construction to draw valid conclusions. It does appear that the sawed-joint system is performing better (at this early date) over jointed portland cement concrete bases than the other treatments, but it should be understood that this observation is based on less than 2 years service.

It is strongly recommended that observations be continued for at least another 2 years with observations twice per year. Forms for performance evaluation are available along with statistical analysis forms that have been designed for this project.

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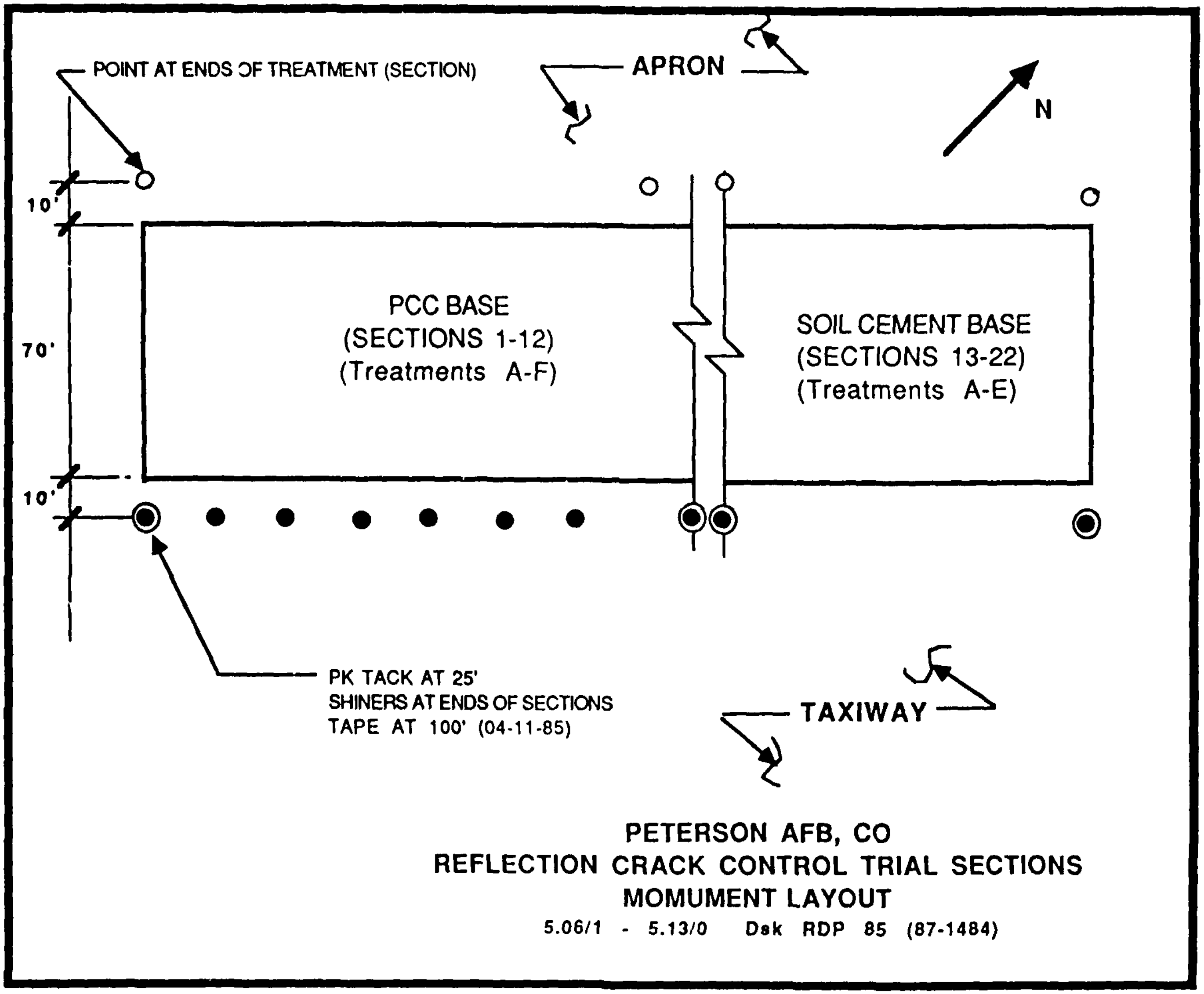
Appendix A

Section Layout

This is a self-contained document with its own internal style, which varies from our format.


POINT AT ENDS OF TREATMENT (SECTION)
APRON
N
10'
70'
10'
PCC BASE
(SECTIONS 1-12)
(Treatments A-F)
SOIL CEMENT BASE
(SECTIONS 13-22)
(Treatments A-E)
PK TACK AT 25'
SHINERS AT ENDS OF SECTIONS
TAPE AT 100' (04-11-85)
TAXIWAY
PETERSON AFB, CO
REFLECTION CRACK CONTROL TRIAL SECTIONS
MOMUMENT LAYOUT
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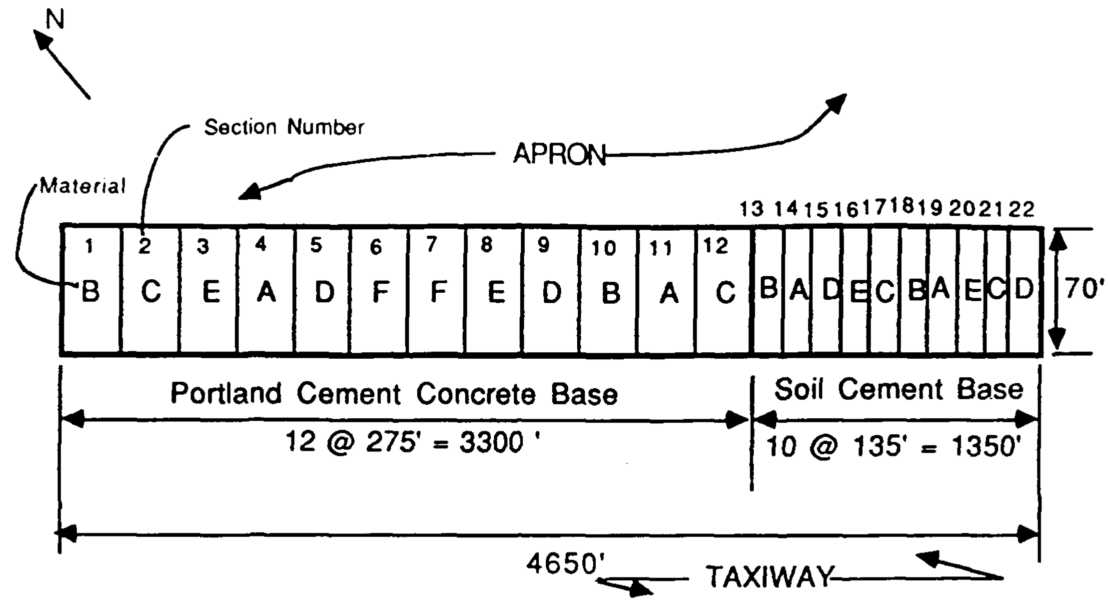
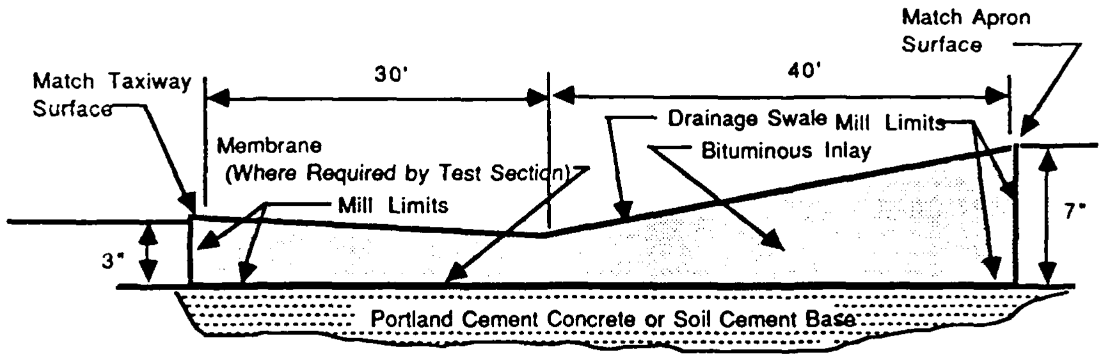


TEST SECTION PLAN



TYPICAL SECTION THROUGH TEST SECTIONS

SECTION DESIGNATION

A Control (3" Asphalt Concrete).
B Asphalt-Rubber.
C Modified Asphalt-Rubber.
D Rubber Filled Asphalt Concrete.
E Fabric
F Sawed Asphalt Concrete.

Note : Materials in Sections 1 and 3 were exchanged during construction. Revised Layout : Section 1 = Matl. B, Section 3 = Matl. E.

PETERSON AIR FORCE BASE. COLORADO
REFLECTION CRACK CONTROL
TRIAL SECTION LAYOUT

5.06/0 -5.13/0 Dsk RDP 85 (87-1484)

LAYOUT REVISED 24 FEB.86

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Appendix B

Construction Specifications

APPLICABLE SPECIFICATION SECTIONS--PETERSON AFB

Section B-1	Bituminous Intermediate and Wearing Courses For Airfields, Heliports, and Heavy-Duty Pavements
Section B-2	Asphalt-Rubber Surface Treatment or Interlayer
Section B-3	Polymer Modified Asphalt-Rubber Surface Treatment or Interlayer
Section B-4	Rubber-Filled Asphalt-Concrete
Section B-5	Polypropylene Pavement Reinforcing Fabric
Section B-6	Cold Milling

SUMMARY OF KEY SPECIFICATION ITEMS

SECTION PARA	ITEM	ITEM DESCRIPTION
B-1, 7.1	Samples	Hot-Mix Aggregates
B-1, 7.2	Certificate	Hot-Mix Aggregate Source Approval
B-1, 8.1.1	Samples	Hot-Mix Field Samples
B-1, 10	Certificates	Waybills and Delivery Tickets for Aggregates and Bituminous Materials
B-1, 14.1.4	Certificates	Hot-Mix Aggregate Quality
B-1, 14.4	Approval	Antistripping Agent (if used)
B-1, 16.1	Mixture Design	Job-Mix Formula (JMF)
B-2, 3.7	Certificates	Specification Compliance for Asphalt-Rubber
B-2, 5.3	Letter	Job Delay and Holdover Times
B-3, 3.3	Certificates	Specification Compliance for Modified Asphalt-Rubber
B-3, 5.3	Letter	Reference 3B-5.3; Job Delay and Holdover Times
B-4, 3	Mixture Design	Job-Mix Formula (JMF) for Rubber Filled Asphalt Concrete
B-4, 3.2	Samples	Asphalt Cement and Rubber Samples
B-4, 5	Samples	Aggregate Samples
B-5, 3	Certificate	Specification Compliance of Polypropylene Pavement Reinforcing Fabric

- END -

Submittals.

SECTION B-1

BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRFIELDS, HELIPORTS, AND HEAVY-DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX)

PART 1 - GENERAL

1. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1 Military Standard (MIL-STD)

MIL-STD 620A & Notice 1	Test Methods for Bituminous Paving Materials

1.2 U.S. Army Corps of Engineers, Handbook for Concrete and Cement:

CRD-C 119-53 Rev. June 63	Flat and Elongated Particles in Coarse Aggregate

1.3 American Society for Testing and Materials (ASTM) Publications:

C 29-78	Unit Weight and Voids in Aggregate
C 88-76	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 127-81	Specific Gravity and Absorption of Coarse Aggregate
C128-79	Specific Gravity and Absorption of Fine Aggregate
C 131-81	Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C 136-82	Sieve Analysis of Fine and Coarse Aggregates
C 183-78	Sampling Hydraulis Cement

D 5-73 (R 1978)	Penetration of Bituminous Materials
D 75-82	Sampling Aggregate
D 140-70 (R 1981)	Sampling Bituminous Materials
D 242-70 (R 1980)	Mineral Filler for Bituminous Paving Mixtures
D 1250-80	Petroleum Measurement Tables
D 1856-79	Recovery of Asphalt from Solution by Abson Method
D 2041-78	Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures
D 2042-81	Solubility of Asphalt Materials in Trichloroethylene
D 2172-81	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
D 2216-80	Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
D 3381-81	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
D 3515-81	Hot-Mixed, Hot-laid Bituminous Paving Mixtures

2. PLANT, EQUIPMENT, MACHINES, AND TOOLS: The Bituminous plant shall be of such capacity, as specified herinafter, to produce the quantities of bituminous mixtures required for the project. Hauling equipment, paving machines, rollers, miscellaneous equipment, and tools shall be provided in sufficient numbers and capacity and in proper working condition to place the bituminous paving mixtures at a rate equal to the plant putput.

3. MIXING PLANTS : The mixing plant shall be an automatic or semiautomatic controlled, commercially manufactured unit designed and operated to consistently produce a mixture within the job-mix formula (JMF).

The plant shall have a minimum capacity of 250 tons per hour. Drum mixers shall be prequalified at the production rate to be used during actual mix production. The prequalification tests will include extraction and recovery of the asphalt cement in accordance with ASTM D 2172 and ASTM D 1856. The penetration of the recovered asphalt binder shall not be less than 60 percent of the original penetration, as measured in accordance with ASTM D 5.

4. WEATHER LIMITATIONS : Bituminous courses shall be constructed only when the base course or existing pavement has no free water on the surface. Unless otherwise directed, asphalt courses shall not be constructed when the temperature of the surface of the existing pavement or base course is below 40 degrees F.

5. PROTECTION OF PAVEMENT : After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until the pavement has cooled to 140 degrees F.

6. GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS : Finished surface of pavements, when tested as specified below and in paragraph ACCEPTABILITY OF WORK, shall conform to elevations shown and to the surface smoothness requirements specified. The grade of the completed surface shall not deviate more than 0.05 foot from the plan grade.

6.1 Plan Grade : Finished surfaces shall conform within tolerances specified to the cross sections indicated. Finished surfaces of airfield and heliport runways, taxiways, and aprons shall vary not more than 0.03 foot from the plan elevation established and approved at site of work, in accordance with the paragraph GRADE CONTROL. Finished surfaces of nonaircraft traffic areas, such as blast pads and stabilized shoulders, shall vary not more than 0.05 foot from plan elevation established and approved at site. Finished surfaces at juncture with other pavements shall coincide with finished surfaces of abutting pavements. The 0.03-foot and 0.05-foot deviations from the plan elevation will not be permitted in areas of pavements where closer conformance with planned elevation is required for the proper functioning of drainage and other appurtenant structures involved. Grade will be determined and evaluated as specified in paragraph ACCEPTABILITY OF WORK.

6.2 Surface Smoothness: Finished surfaces shall not deviate from the testing edge of a 12-foot straightedge more than the tolerances shown for the respective pavement category shown in Table 1. Surface smoothness will be determined and evaluated as specified in paragraph ACCEPTABILITY OF WORK.

6.3 Straightedge: The Contractor shall furnish and maintain at the site, in good condition, one straightedge for each bituminous paver, for use of the Contracting Officer in testing the finished surface. Straightedges shall be constructed of aluminum and shall have blades of box or box-girder cross section with flat bottom reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on pavement.

TABLE 1. SURFACE-SMOOTHNESS TOLERANCES

Item No.	Pavement Category	Direction of Testing	Tolerance for Intermediate Course, inch	Tolerance for Wearing Course, inch
1.	Runways and Taxiways	Longitudinal	1/4	1/8
		Transverse	1/4	1/4
2.	Calibration hardstands and compass swinging bases	Longitudinal	1/4	3/16
		Transverse	1/4	3/16
3.	All other airfield and helicopter paved areas	Longitudinal	1/4	1/4
		Transverse	1/4	1/4

7. AGGREGATE SAMPLING AND TESTING

7.1 Aggregates: Samples of aggregates shall be furnished by the Contractor for approval of aggregate sources and stockpiles prior to the start of production and at intervals during production of the bituminous mixtures. Intervals and points of sampling will be designated by the Contracting Officer. Samples will be the basis of approval of specific sources or stockpiles of aggregates for aggregate requirements. Unless otherwise directed, ASTM D 75 shall be used in sampling coarse aggregate and fine aggregate, and ASTM C 183 shall be used in sampling mineral filler

All tests necessary to determine compliance with requirements specified herein will be made by the Government at no expense to the Contractor.

7.2 Sources: Sources of aggregates shall be selected well in advance of the time the materials are required in the work. If a previously developed source is selected, samples shall be submitted 30 calendar days before starting production, with evidence that central-plant, hot-mix bituminous pavements constructed with the aggregates have had a satisfactory service record of at least five years under similar climatic and traffic conditions. Satisfactory service record for an aggregate will be determined based on the aggregate's ability to resist polishing, raveling, stripping, and degradation under traffic and climatic conditions similar to those expected during its use. If performance data indicate that an aggregate is susceptible to one or more of the above-mentioned problems, that source of aggregate shall be rejected. When new sources are developed, the Contractor shall indicate sources and submit samples and his plan for operation 60 calendar days before starting production. The Contracting Officer will make such tests and other investigations as necessary to determine whether aggregates meeting the requirements specified herein can be produced from the proposed sources. Approval of the source of aggregates does not relieve the Contractor of the responsibility for delivery at the jobsite of aggregates that meet the requirements specified herein.

8. ACCEPTABILITY OF WORK:

8.1 General: A lot shall be that quantity of construction that will be evaluated for compliance with specification requirements. A lot shall be equal to 1000 tons or one days production, whichever is less. Testing for acceptability of work will be performed by the Government.

8.1.1 In order to evaluate aggregate gradation, asphalt content, and density, each lot shall be divided into four equal sublots. For density, determination, one random sample shall be taken from the mat, and one ramdom sample shall be taken from the joint of each sublot. Each random sample shall weigh at least 1250 grams. After air drying to a constant weight, random samples obtained from the mat will be used for density determination using MIL-STD-620, Method 101. Samples for determining asphalt content and aggregate gradation shall be taken from loaded trucks within each sublot. Asphalt content will be determined in accordance with ASTM D 2172, Method A or B. Gradation of the aggregate shall be determined from the recovered aggregate according to ASTM C 136.

8.1.2 When a lot of material fails to meet the specification requirements, that lot shall be removed and replaced or accepted at a reduced price. The lowest payment for any pavement characteristic (i.e., gradation, asphalt content, density, grade, and smoothness) discussed below shall be the percent payment for that lot. The percent payment is applied to the bid price to determine actual payment

8.1.3 The Contracting Officer reserves the right to sample and test any area which appears to deviate from the specification requirements. Testing in these areas will be in addition to the lot testing, and the requirements for these areas will be the same as those for a lot.

8.2 Aggregate Gradation. The mean absolute deviation of the four sublot aggregate gradations from the JMF for each sieve size will be evaluated and compared with Table II. The percent payment based on aggregate gradation shall be the lowest value determined for any sieve size in Table II. All aggregate gradation results will be reported within 24 hours after completion of construction of each lot. The computation of mean absolute deviation for one sieve size is illustrated below:

Example: Assume the following JMF and sublot test results for aggregate gradation.

Sieve Size	JMF	Test No 1	Test No 2	Test No. 3	Test No. 4
3/4 in.	100	100	100	100	100
1/2 in.	88	87	88	90	88
3/8 in.	75	72	77	78	74
No. 4	64	60	65	67	62
No. 8	53	50	56	57	52
No. 16	42	39	44	45	41
No. 30	32	30	34	35	32
No. 50	20	17	20	22	21
No. 100	10	8	10	10	11
No 200	6	4	7	8	6

$$\text{Mean Absolute Deviation (No 200 sieve)} = \frac{|4-6| + |7-6| + |8-6| + |6-6|}{4}$$

$$= \frac{2 + 1 + 2 + 0}{4} = 1.25$$

The mean absolute deviation for other sieve sizes can be determined in a similar way for this example to be

Sieve Size	3/4 Inch	1/2 Inch	3/8 Inch	No. 4	No 8	No 16	No. 30	No. 50	No 100
Mean Absolute Deviation	0	0.75	2.25	2.50	2.75	2.25	1.75	1.50	0.75

The least payment for any sieve size listed in Table II would be 98 percent for the No. 200 sieve. Therefore for this example the percent payment determined for aggregate gradation is 98 percent

8.3 Asphalt Content. The mean absolute deviation of the four asphalt contents from the JMF will be evaluated and compared with Table III. The percent payment for asphalt content shall be the value determined in accordance with Table III. All asphalt content results will be reported within 24 hours after completion of construction of each lot.

TABLE II

PERCENT PAYMENT FOR MEAN ABSOLUTE DEVIATION
OF AGGREGATE GRADATIONS FROM JMF

Sieve Size	Percent Payment for Mean Absolute Deviation from JMF 0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	Above 6.0
3/4 In.	100	100	100	100	98	95	90
1/2 In.	100	100	100	100	98	95	90
3/8 In.	100	100	100	100	98	95	90
No. 4	100	100	100	100	98	95	90
No. 8	100	100	100	98	95	90	Reject
No. 16	100	100	100	98	95	90	Reject
No. 30	100	100	100	98	95	90	Reject
No. 50	100	100	100	98	95	90	Reject
No. 100	100	98	95	90	90	Reject	Reject
No. 200	100	98	90	Reject	Reject	Reject	Reject

TABLE III

PERCENT PAYMENT FOR ASPHALT

Mean Absolute Deviation of Extracted Asphalt Content from JMF	Percent Payment
Less than 0.20	100
0.21 - 0.30	98
0.31 - 0.35	95
0.36 - 0.40	90
Above 0.40	Reject

8.4 Density. The average mat density and the average joint density will be expressed as a percentage of the laboratory density. The laboratory density for each lot will be determined from four sets of laboratory samples. One sample will be obtained from each of the four sublots. Laboratory samples will be prepared from asphalt mixture which has not been reheated in the laboratory. Samples will be compacted in accordance with MIL-STD-620 within 2 hours of the time the mixture was loaded into trucks at the asphalt plant.

8.4.1 The field density will be determined and compared with Table IV. The percent payment for density shall be the lowest value determined from Table IV. The percent payment for mat density represents all of the material placed in the lot. The percent payment for joint density is based on the amount of material represented by an area equal to the lot joint length by 10 feet wide not to exceed the lot size.

8.4.2 All density results on a lot will be completed and reported within 24 hours after construction of that lot. When the Contracting Officer considers it necessary to take additional samples for density measurements, sampling will be done in groups of four (one for each sublot). The percent payment shall be determined for each additional group of four samples and averaged with the percent payment for the original group to determine the final percent payment. The Contractor shall fill all sample holes with hot mix and compact.

8.5 Grade. The finished surface of the pavement will be tested for conformance with specified plan-grade requirements. The finished grade of each pavement area will be determined by running lines of levels at intervals of 25 feet or less longitudinally and transversely to determine the elevation of the completed pavement. Within 5 working days after completion of a particular lot, the Contracting Officer will inform the Contractor in writing of results of grade-conformance tests. When more than 5 percent of all measurements made within a lot are outside the specified tolerances, the payment for that lot will not exceed 95 percent of the bid price. In areas where the grade exceeds the plan-grade tolerances given in paragraph GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS by more than 50 percent, the Contracting Officer shall require removal and replacement of the deficient area at no additional cost to the Government. Sufficient material shall be removed to allow at least 1 inch of asphalt concrete to be placed. Skin patching for correcting low areas or planing for correcting high areas shall not be permitted on the wearing course.

TABLE IV

PERCENT PAYMENT FOR DENSITY

Ave. Mat Density (4 Cores)	Percent Payment	Ave. Joint Density (4 Cores)
98.0, 100.0	100	Above 96.5
97.9	100	96.4
97.8, 100.1	99.9	96.3
97.7	99.8	96.2
97.6, 100.2	99.6	96.1
97.5	99.4	96
97.4, 100.3	99.1	95.9
97.3	98.7	95.8
97.2, 100.4	98.3	95.7
97.1	97.8	95.6
97.0, 100.5	97.3	95.5
96.9	96.3	95.4
96.8, 100.6	94.1	95.3
96.7	92.2	95.2
96.6, 100.7	90.3	95.1
96.5	87.9	95
96.4, 100.8	85.7	94.9
96.3	83.3	94.8
96.2, 100.9	80.6	94.7
96.1	78	94.6
96.0, 101.0	75	94.5
Below 96.0	Reject	Below 94.5
Above 101.0	Reject	

8.6 Surface Smoothness : After the completion of final rolling of a lot, the compacted surface will be tested by the Contracting Officer with a 12-foot straightedge. Measurements will be made perpendicular to and across all joints at equal distances along the joint not to exceed 25 feet. Location and deviation from straightedge for all measurements will be recorded. When more than 5 percent of all measurements along the joints within the lot exceed the specified tolerance, the unit price for that lot shall not exceed 95 percent of the bid price. Any joint or mat area surface deviation which exceeds the tolerance given in Table I by more than 50 percent shall be corrected to meet the specification requirements.

9. ACCESS TO PLANT AND EQUIPMENT : The Contracting Officer shall have access at all times to all parts of the paving plant for checking adequacy of equipment in use; inspecting operation of the plant; verifying weights, proportions, and character of materials; and checking temperatures maintained in preparation of mixtures.

10. WAYBILLS AND DELIVERY TICKETS : Waybills and delivery tickets shall be submitted to the Contracting Officer during progress of the work. Before the final statement is allowed, the Contractor shall file with the Contracting Officer certified waybills and certified delivery tickets for all aggregates and bituminous materials actually used in the construction and covered by the contract.

11. MEASUREMENT :

11.1 Intermediate and Wearing-Course Tonnage : The amount paid for will be the number of 2,000-pound tons of bituminous mixture used in the accepted work. Bituminous mixture shall be weighed after mixing, and no deduction will be made for weight of bituminous materials incorporated herein.

11.2 Correction Factor for Aggregate Used Quantities of paving mixtures called for are based on aggregates having a specific gravity of 2.70 as determined in accordance with the Apparent Specific Gravity paragraphs in ASTM C 127 and ASTM C 128. Correction in tonnage of intermediate and wearing-course mixtures shall be made to compensate for the difference in tonnage of mixtures used in the project, when specific gravities of aggregates used in mixtures are more than 2.75 and less than 2.65. Tonnage paid for will be the number of tons used, proportionately corrected for specific gravities, using 2.70 as the base correctional factor

11.3 Bituminous Material. Bituminous material to be paid for shall be the number of 2,000-pound tons of material used in the accepted work

12. PAYMENT: Quantities of intermediate and wearing-course mixtures and bituminous materials, determined as specified above, will be paid for at respective contract unit prices or at specified reduced prices. Payment shall constitute full compensation for preparing or reconditioning the base course or existing pavement; for furnishing all materials, equipment, plant, and tools: and for all labor and other incidentals necessary to complete the work required by this section of the specifications

PART 2 - PRODUCTS

13. BITUMINOUS HOT MIX shall consist of coarse aggregate, fine aggregate, mineral filler, bituminous material, and approved additives, if required, of the quqlities and in the proportions specified.

14. PROPERTIES OF AGGREGATES, BITUMINOUS MATERIALS, AND BITUMINOUS MIXTURES:

14.1 Aggregates: Aggregates shall consist of natural sand, crushed stone, crushed gravel, crushed slag, screenings, sand, and mineral filler, as required. The portion of materials retained on the No. 4 sieve shall be known as coarse aggregate; the portion passing the No. 4 sieve and retained on the No. 200 sieve as fine aggregate; and the portion passing the No. 200 sieve as mineral filler. Aggregate gradation shall conform to gradation(s) specified in Table V. Table V is based on aggregates of uniform specific gravity; the percentage passing various sieves may be changed by the Contracting Officer when aggregates of varying specific gravities are used. Adjustments of percentages passing various sieves may be directed by the Contracting Officer when aggregates vary by more than 0.2 in specific gravity

TABLE V. AGGREGATE GRADATION

Sieve	Percent Passing
3/4 in	100
1/2 in	82 ± 10
3/8 in	74 ± 10
No. 4	56 ± 10
No 8	41 ± 10
No 50	6 ± 7
No. 200	7.5 ± 3

14.1.1 Coarse aggregate shall consist of clean, sound, durable particles meeting the following requirements

14.1.1.1 Percentage of loss shall not exceed 40 after 500 revolutions, as determined in accordance with ASTM C 131

14.1.1.2 Percentage of loss shall not exceed 15 after five cycles performed in accordance with ASTM C 88 using magnesium sulfate.

14.1.1.3 The dry weight of crushed slag shall not be less than 75 pcf, as determined in accordance with ASTM C 29.

14.1.1.4 Crushed gravel retained on the No. 4 sieve and each coarser sieve listed in Table V shall contain at least 75 percent by weight of crushed pieces having two or more fractured faces with the area of each face equal to at least 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of fractures shall be at least 30 degrees to count as two fractured faces

14.1.1.5 Particle shape of crushed aggregates shall be essentially cubic. Quantity of flat and elongated particles in any sieve size shall not exceed 20 percent by weight, when determined in accordance with CRD-C 119.

14.1.2 Fine aggregate shall consist of clean, sound, durable, angular particles produced by crushing stone, slag, or gravel that meets requirements for wear and soundness specified for coarse aggregate. Fine aggregate produced by crushing gravel shall have at least 90 percent by weight of

crushed particles having two or more fractured faces in the portion retained on the No. 30 sieve. This requirement shall apply to material before blending with natural sand, when blending is necessary. Quantity of natural sand to be added to the wearing or intermediate-course mixtures shall not exceed 15 percent by weight of coarse and fine aggregate and material passing the No. 200 sieve. Natural sand shall be clean and free from clay and organic matter. Percentage of loss shall not exceed 15 after five cycles of the soundness test performed in accordance with ASTM C 88 using magnesium sulfate.

14.1.3 Mineral filler shall conform to ASTM D 242 except the following gradations will be included:

Grain Size in mm	Percent finer
0.05	70-100
0.02	35-65
0.005	10-22

14.1.4 Sampling and Testing: Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved independent commercial testing laboratory with results certified by a registered professional engineer. Certification based on past performance of the aggregates and testing can be used with the approval of the Contracting Officer. Approval must be obtained 30 calendar days prior to use of the aggregates.

14.2 Bituminous Materials: Samples of bituminous materials shall be obtained by the Contractor; sampling shall be in accordance with ASTM D 140 Tests necessary to determine conformance with requirements specified herein will be performed by the Contracting Officer without cost to the Contractor. Sources where bituminous materials are obtained shall be selected in advance of time when materials will be required in the work, and samples of the asphalt cement specified shall be submitted for approval not less than seven days before production of the asphalt mixture

14.2.1 Asphalt cement shall conform to ASTM D 3381 Table 1, Grade AC-20.

14.2.2 In addition to initial qualification testing of bituminous materials, samples shall be taken before and during construction when shipments of bituminous materials are received or when necessary to assure that handling or storage has not been detrimental to the bituminous material. The samples shall be taken by the Contractor and tested by the Contracting Officer.

14.3 Bituminous Mixtures : Sampling and testing will be accomplished by the Contracting Officer. Bituminous mixtures shall conform to requirements contained in paragraphs PROPORTIONING OF MIXTURE and ACCEPTABILITY OF WORK.

14.4 Additives : The use of additives such as antistripping and antifoaming agents is subject to approval by the Contracting Officer.

15 DELIVERY, STORAGE, AND HANDLING OF MATERIALS :

15.1 Mineral Aggregates : Mineral aggregates shall be delivered to the site of the bituminous mixing plant and stockpiled in such a manner as to preclude fracturing of the aggregate particles, segregation, contamination, or intermingling of different materials in the stockpiles or cold-feed hoppers. Mineral filler shall be delivered, stored, and introduced into the mixing plant in a manner to preclude exposure to moisture or other detrimental conditions.

15.2 Bituminous Materials : Bituminous materials shall be maintained at appropriate temperature during storage but shall not be heated by application of direct flame to walls of storage tanks or transfer lines. Storage tanks, transfer lines, and weigh bucket shall be thoroughly cleaned before a different type or grade of bitumen is introduced into the system. The asphalt cement shall be heated sufficiently to allow satisfactory pumping of the material: however, the storage temperature shall be maintained below 300 degrees F.

16 PROPORTIONING OF MIXTURE

16.1 Job Mix Formula : The mixture design and job mix formula will be developed by the Contractor at no additional expense to the Government. The mixture design shall be prepared under the direct supervision of a registered professional engineer experienced in the development of mixture designs and mixture design testing. Procedures for the mixture design will be in accordance with MIL-STD-620 and to the criteria described in paragraphs 14 and 16. The proposed mixture design and job mix formula will be submitted

to the Contracting Officer for approval 21 days prior to beginning production of bituminous mixture for this project No payment will be made for mixture produced prior to the approval of the mixture design and job mix formula. The formula will indicate the percentage of each stockpile and mineral filler, the percentage passing each sieve size, the percentage of bitumen, and the temperature of the completed mixture when discharged from the mixer The proposed mixture design will also include source of bituminous material and source of aggregates along with certification that aggregates meet the requirements of paragraph 14. Tolerances are given in Table VI for asphalt content, temperature, and aggregate grading for tests conducted on the mix as discharged from the mixing plant; however, the final evaluation of aggregate gradation and asphalt content will be based on paragraph ACCEPTABILITY OF WORK. Bituminous mixture that deviates more than 25 degrees from JMF shall be rejected. The JMF may be adjusted during construction to improve paving mixtures, as directed, without adjustments in the contract unit price.

TABLE VI. JOB-MIX TOLERANCES

Material	Tolerance, Plus or Minus
Aggregate passing No. 4 or larger sieves	4 percent
Aggregate passing Nos. 8, 16, 30, and 50 sieves	3 percent
Aggregate passing Nos. 100 and 200 sieves	1.0 percent
Bitumen	0.20 percent
Temperature of mixing	25 degrees F

16.2 Test Properties of Bituminous Mixtures: Finished mixture shall meet requirements described below when tested in accordance with MIL-STD-620 (75 blow, Marshall Method). All samples will be compacted with 75 blows of specified hammer on each side of sample. When bituminous mixture fails to meet the requirements specified below, the paving operation shall be stopped until the cause of noncompliance is determined and corrected.

16.2.1 Requirements for stability, flow, and voids are shown in Tables VII and VIII for nonabsorptive and absorptive aggregates, respectively.

TABLE VII. NONABSORPTIVE-AGGREGATE MIXTURE

Stability minimum, pounds	1800
Flow maximum, 1/100 inch units	16
Voids total mix, percent (1)	3-5
Voids filled with bitumen, percent	70-80

(1) The Contracting Officer may permit deviations from limits specified when gyratory method of design is used to develop JMF.

TABLE VIII. ABSORPTIVE-AGGREGATE MIXTURE

Stability minimum, pounds	1800
Flow maximum, 1/100 inch units	16
Voids total mix, percent (1)	2-4
Voids filled with bitumen, percent	75-85

(1) The Contracting Officer may permit deviations from limits specified when gyratory method of design is used to develop JMF

16.2.1.1 When the water-absorption value of the entire blend of aggregate does not exceed 2.5 percent, as determined in accordance with ASTM C 127 and C 128, the aggregate is designated as nonabsorptive. The theoretical specific gravity computed from the apparent specific gravity or ASTM D 2041 will be used in computing voids total mix and voids filled with bitumen, and the mixture shall meet the requirements in Table VII

16.2.1.2 When the water-absorption value of the entire blend of aggregate exceeds 2.5 percent as determined in accordance with ASTM C 127 and ASTM C 128, the aggregate is designated as absorptive. The theoretical specific gravity computed from the bulk-impregnated specific gravity method contained in MIL-STD-620, Method 105 or ASTM D 2041 shall be used in computing percentages of voids total mix and voids filled with bitumen; the mixture shall meet requirements in Table VIII, when MIL-STD-620, Method 105 is used and Table VII when ASTM D 2041 is used.

16.2.2 The index of retained stability must be greater than 75 percent as determined by MIL-STD-620, Method 104. When the index of retained stability is less than 75, the aggregate stripping tendencies may be countered by the use of hydrated lime or by treating the bitumen with an approved antistripping agent. The hydrated lime is considered as mineral filler and should be considered in the gradation requirements. The amount of hydrated lime or antistripping agent added to bitumen shall be sufficient, as approved by the Contracting Officer, to produce an index of retained stability of not less than 75 percent. No additional payment will be made to the Contractor for addtion of antistripping agent or hydrated lime required.

PART 3 - EXECUTION

17. CONDITIONING OF BASE COURSE OR EXISTING PAVEMENT: Previously constructed base course or existing pavement shall be conditioned as specified below. In all cases, prior to the laying of bituminous course, the surface shall be prepared as directed that will include a tack coat for asphalt concrete and sawed asphalt concrete test sections

17.1 Treatment of Existing Pavements That Will Serve as Base for Overlay or Other Treatments.

17.1.1 Seal all cracks that are wider than 1/8 inch

17.1.1.1. Joints and cracks that are greater than 1/8 inch and less than 1/4 inch in opening width shall be cleaned by compressed air. This cleaning shall remove all loose material such as old sealant and debris that has accumulated as a result of service or removal of existing overlay(s). These cracks shall be filled with a sealant approved by the Contracting Officer. Sealant shall be allowed sufficient time to cure prior to placement of any overlay material including fabric, stress absorbing membrane interlayer, or conventional asphalt concrete overlay.

17.1.1.2 Joints and cracks that are wider than 1/4 inch shall be cleaned by a combination of mechanical routing, wire brushing, or high-pressure water blasting and compressed air to remove all old sealant, and other materials such as old paving components and debris All joints and cracks will be allowed to come to complete dryness before any subsequent applications of sealant, overlay, or other following work Joints and cracks that are wider than 1/4 inch and less than 1/2 inch shall be filled to within 1/2 inch of the surface at the time of sealing with a sealant material approved by the Contracting Officer. Joints and cracks with openings greater than 1/2 inch shall be filled to within 1/2 inch of the surface at the time of sealing with a sealant consisting of 80 percent by weight of mixture of fine sand and 20 percent slow cure emulsified asphalt that is hand rammed and compacted into the joint or crack.

18. GRADE CONTROL : Lines and grades shown on contract drawings for each pavement category of contract shall be established and maintained by means of line and grade stakes placed at the site of work by the Contractor Elevations of bench marks used by the Contractor for controlling airfield and heliport pavement operations at the site of work will be determined, established, and maintained by the Government. Finished pavement elevations shown shall be established and controlled at the site of work by the Contractor in accordance with bench mark elevations furnished by the Contracting Officer.

19 PREPARATION OF MINERAL AGGREGATES : Each aggregate stockpile shall be placed and maintained in such a manner to prevent segregation. Rates of feed of aggregates shall be regulated so that moisture content and temperature of aggregates will be within tolerances specified herein. Dry storage shall be provided for mineral filler.

20 PREPARATION OF BITUMINOUS MIXTURES : Aggregates, mineral filler, and bitumen shall be conveyed into the mixer in proportionate quantities required to meet the JMF. Mixing time shall be as required to obtain a uniform coating of the aggregate with the bituminous material. Temperatures of bitumen at the time of mixing shall not exceed 300 degrees F. Temperature of aggregate and mineral filler in the mixer shall not exceed 325 degrees F when the bitumen is added. Overheated and carbonized mixtures or mixtures that foam will be rejected.

21. WATER CONTENT OF AGGREGATES: Drying operations shall reduce the water content of mixture to less than 0.75 percent. Water content test will be conducted in accordance with ASTM D 2216: weight of sample shall be at least 500 grams. If water content is determined on hot bin samples, the water content will be a weighted average based on the composition of the blend.

22. STORAGE OF BITUMINOUS PAVING MIXTURE. Storage of bituminous paving mixture shall conform to the applicable requirements of ASTM D 3515, however, in no case shall the mixture be stored for more than 4 hours.

23. TRANSPORTATION OF BITUMINOUS MIXTURE: Transportation from the production plant to the site shall be in trucks having tight, clean, smooth beds lightly coated with an approved relasing agent to prevent adhesion of mixture to truck bodies. Excessive releasing agent shall be drained prior to loading. Each load shall be covered with canvas or other approved material of ample size to protect mixture from weather and prevent loss of heat if directed by the Contracting Officer. Loads that have crusts of cold, unworkable material or have become wet by rain will be rejected. Hauling over freshly placed material will not be permitted.

24. PLACING: Bituminous mixtures shall not be placed without ample time to complete spreading and rolling during daylight hours, unless approved satisfactory lighting is provided.

24.1. Surface Preparation of Underlying Course. Prior to the placing of intermediate or wearing course, the underlying course shall be cleaned of all foreign or objectionable matter with power brooms and hand brooms.

24.2. Spraying Contact Surfaces of Structures. Contact surfaces of previously constructed pavement, curbs, manholes, and similar structures shall be sprayed with a thin coat of bituminous material conforming to the requirements of TACK COAT.

24.3. Offsetting Joints in Intermediate and Wearing Courses. The wearing course shall be placed so that the longitudinal joints of the wearing course will be offset from joints in the intermediate course by at least 1 foot. Transverse joints in the wearing course shall be offset by at least 2 feet from the transverse joints in the intermediate course.

24.4. General Requirements for Use of Mechanical Spreader. The range of temperatures of mixtures, when dumped into the mechanical spreader, shall be as determined by the Contracting Officer. Unless otherwise specified, mixtures having temperatures less than 225 degrees F. when dumped into the mechanical spreader will be rejected. The mechanical spreader shall be adjusted and the speed regulated so that the surface of the course being laid will be smooth and continuous without tears and pulls, and of such depth that, when compacted, the surface will conform to the cross section indicated. Placing with respect to centerline areas with crowned sections or high sides of areas with one-way slope shall be as directed. Each lot of material placed shall conform to requirements specified in paragraph ACCEPTABILITY OF WORK. Placing of the mixture shall be as nearly continuous as possible, and the speed of placing shall be adjusted, as directed, to permit proper rolling. When segregation occurs in the mixture during placing, the spreading operation shall be suspended until the cause is determined and corrected.

24.5. Placing Strips Succeeding Initial Strips: In placing each succeeding strip after the initial strip has been spread and compacted as specified below, the screed of the mechanical spreader shall overlap the previously placed strip 2 to 3 inches and be sufficiently high so that compaction produces a smooth dense joint. Mixture placed on the edge of a previously placed strip by the mechanical spreader shall be pushed back to the edge of the strip by the use of a lute. Excess material shall be removed and wasted.

24.6. Handspreading in Lieu of Machine Spreading. In areas where use of machine spreading is impractical, the mixture shall be spread by hand. Spreading shall be in a manner to prevent segregation. The mixture shall be spread uniformly with hot rakes in a loose layer of thickness, that when compacted, will conform to the required grade, density, and thickness.

25. COMPACTION OF MIXTURE. Sufficient rollers (size, type, and number) shall be furnished to obtain the specified compaction. Rolling shall begin as soon after placing as the mixture will bear a roller without undue displacement. Delays in rolling freshly spread mixture will not be permitted. After initial rolling, preliminary tests of crown, grade, and smoothness shall be made by the Contractor. Deficiencies shall be corrected so that the finished course will conform to requirements for grade and smoothness specified herein. Crown, grade, and smoothness will be checked for compliance in each lot of completed pavement by the Contracting Officer and will be evaluated as specified in paragraph ACCEPTABILITY OF WORK.

After the crown, grade, and smoothness requirements have been met, rolling shall be continued until a mat density of 98.0 to 100.0 percent and a joint density of 96.5 to 100.0 percent of density of laboratory-compacted specimens of the same mixture are obtained. The density will be determined and evaluated as specified in paragraph ACCEPTABILITY OF WORK. Places inaccessible to rollers shall be thoroughly compacted with hot hand tampers.

25.1 Testing of Mixture. At the start of plant operation, a quantity of mixture shall be prepared sufficiently to construct a test section at least 50 feet long and two spreader widths wide. Mixture shall be placed, spread, and rolled with the equipment to be used in the project and in accordance with requirements specified above. This test section shall be tested and evaluated as a lot and shall conform to all specified requirements. If test results are satisfactory, the test section shall remain in place as part of the completed pavement. If tests indicate that the pavement does not conform to specification requirements, necessary adjustments to the plant operations and rolling procedures shall be made immediately. Additional test sections, as directed, shall be constructed and sampled for conformance with specification requirements. In no case shall the Contractor start full production of an intermediate or wearing course mixture without approval.

25.2 Correcting Deficient Areas: Mixtures that become contaminated or are defective shall be removed to the full thickness of the course. Edges of the area to be removed shall be cut so that the sides are perpendicular and parallel to the direction of traffic and so that the edges are vertical. Edges shall be sprayed with bituminous materials conforming to BITUMINOUS TACK COAT. Fresh paving mixture shall be placed in the excavated areas in sufficient quantity so that the finished surface will conform to the grade and smoothness requirements. Paving mixture shall be compacted to the density specified herein. Skin patching of an area that has been rolled shall not be permitted.

26 JOINTS

26.1 General. Joints between old and new pavements, or between successive days' work, or joints that have become cold (less than 175 degrees F.) because of any delay shall be made to insure continuous bond between the old and new sections of the course. All joints shall have the same texture and smoothness as other sections of the course. Contact surfaces of previously constructed pavements coated by dust, sand, or other objectionable material shall be cleaned by brushing or shall be cut back as directed. When directed

by the Contracting Officer, the surface against which new material is placed shall be sprayed with a thin, uniform coat of bituminous material conforming to BITUMINOUS TACK COAT. Material shall be applied far enough in advance of the placement of fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of the sprayed surface.

26.2 Transverse Joints: The roller shall pass over the unprotected end of a strip of freshly placed material only when the placing is discontinued or the delivery of the mixture is interrupted to the extent that material in place may become cold. In all cases, prior to continuing placement, the edge of previously placed pavement shall be cut back to expose an even vertical surface for full thickness of the course. In continuing placement of the strip, the mechanical spreader shall be positioned on the transverse joint so that sufficient hot mixture will be spread to obtain a joint after rolling that conforms to the required density and smoothness specified herein.

26.3 Longitudinal Joints: Edges of a previously placed strip shall be prepared such that the pavement in and immediately adjacent to the joint between this strip and the succeeding strip meets the requirements for grade, smoothness, and density as described in paragraph ACCEPTABILITY OF WORK.

SECTION B-2

ASPHALT - RUBBER SURFACE TREATMENT OR INTERLAYER *

1. APPLICABLE PUBLICATIONS : The Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1.1 American Society for Testing and Materials (ASTM) Publications

D 88-81	Saybolt Viscosity
D 92-78	Flash and Fire Points By Cleveland Open Cup
D2007-75	Test Method for Characteristic Groups in Rubber Extender and Processing Oils by the Clay-Gel Adsorption Chromatographic Method
D 850-79	Methods for Distillation of Industrial Aromatic Hydrocarbons and Related Materials
D 297-81	Methods for Rubber Products - Chemical Analysis

*For surface preparation, see Section B-1, paragraph 17.

C 136-83	Sieve Analysis of Fine and Coarse Aggregates
D 448-80	Standard Sizes of Coarse Aggregate for Highway Construction
D 2994-71	Rubberized Tar
C 566 -78	Total Moisture Content of Aggregate by Drying

1.2 American Association of State Highway and Transportation Officials (AASHTO):

M 283-81	Coarse Aggregate for Highway & Airport Construction
T 202-80	Viscosity of Asphalts by Vacuum Capillary Viscometer
M 20-70	Penetration Graded Asphalt Cement
M 226-80	Viscosity Graded Asphalt Cement

2. DESCRIPTION: This work involves placement of an asphalt-rubber treatment on a prepared pavement surface in accordance with the plans and specifications.

2.1 This specification describes two known proprietary processes for production of the treatment hereinafter known as Method A and Method B. Method A uses ground vulcanized rubber and an extender oil whereas Method B uses ground vulcanized rubber and a kerosene diluent. Either method is acceptable based on proper compliance with the specifications and certification of materials.

3. MATERIALS:

3.1 Asphalt Cement: Asphalt cement shall meet the requirements of AASHTO M 20 (Table 1) or M 226 (Table 1 or 3). Acceptable grades for the respective materials will depend on location and circumstances and will require approval of the Supplier of the Asphalt-Rubber. In addition, it shall be fully compatible with the ground rubber proposed for the work as determined by the Supplier.

3.2 Rubber Extender Oil (Method A): Extender oil shall be a resinous, high flash point aromatic hydrocarbon meeting the following test requirements:

Viscosity, SSU, at 100 degrees F. (ASTM D 88)	2500 min.	ARCO METHOD
Flash Point, COC, degrees F. (ASTM D 92)	390 min.	
Molecular Analysis (ASTM D 2007):		
Asphaltenes, Wt. %	0.1 max.	
Aromatics, Wt. %	55.0 mim.	

3.3 Kerosene-Type Diluent (Method B). The kerosene-type diluent used shall be compatible with all materials used and shall have a flash point (ASTM D 92) of not less than 80 degrees F. The initial boiling point shall not be less than 300 degrees F with the total distillaion (dry point) before 450 degrees F (ASTM D 850). The Contractor is cautioned that a normal kerosene or range oil cut may not be suitable.

SAHUARO METHOD

3.4 Ground Rubber Components:

3.4.1 For Method A: The rubber shall be a ground tire rubber, recommended by the Supplier for this use and with the approval of the Contracting Officer. The rubber shall meet the following physical and chemical requirements:

3.4.1.1 Two types of rubber shall be blended. Rubber types 1 and 2 shall meet the requirements of Table 1 with the tests as described by ASTM D 297. The rubbers shall be blended such that the resulting material conforms to the requirements of Table 1.

TABLE I. RUBBER REQUIREMENTS

Property	TYPE 1 Min.	TYPE 1 Max.	TYPE 2 Min.	TYPE 2 Max.	BLEND Min.	BLEND Max.
Specific Gravity	1.15	1.17	1.12	1.14	1.14	1.16
Total Extract (%)	14	21	8	12	12	15
Ash (Wt.%)	3.0	6.0	3.8	4.2	4.5	5.5
Free Carbon (Wt. %)	28	32	27	29	27.5	29.5
Total Sulfur (Wt. %)	1.0	1.2	1.0	1.2	1.0	1.2
Rubber Polymer:						
Natural Rubber (Wt. %)	18	32	85	95	50	60
Styrene Butadiene (Wt. %)	58	82	85	95	35	45
Polybutadiene (Wt. %)	0	12	0	0	4	8
Rubber Hydrocarbon (Wt. %)	50	65	50	60	55	65

3.4.1.2. The rubber blend shall be dry and free-flowing, free of wire, fabric, or other contaminants, except up to 4 weight percent of mineral powder may be included to prevent sticking of particles. Rubber constituents and moisture content shall be such that when mixed with asphalt, foaming of the blend does not occur.

3.4.1.3 Sieve Analysis (ASTM C 136)

Sieve	Percent Passing
No. 8	100
No. 30	30-50
No. 50	5-30
No. 100	0-5

3.4.2 For Method B: The rubber shall be a ground tire rubber, 100 percent vulcanized, recommended by the Supplier for this use and with the approval of the Contracting Officer.

3.4.2.1 Composition: The rubber shall comply with the requirements for Type 1 rubber described in Table 1.

3.4.2.2 The rubber shall be dry and free flowing, free from wire, fabric, or other contaminants except up to 4 weight percent of a mineral powder may be included to prevent sticking of the particles. Rubber constituents and moisture content shall be such that when mixed with asphalt, foaming of the blend will not occur.

3.4.2.3 Sieve Analysis (ASTM C 136):

Sieve	Percent Passing
No. 8	100
No. 10	98-100
No. 30	0-10
No. 50	0-2

3.5 Aggregates: Cover aggregates shall be a dry, clean material meeting the requirements of AASHTO M 283 and the additional requirements listed below:

3.5.1 Only crushed stone or slag will be acceptable. Hot or precoated aggregates, if used, will be by special provisions in the documents.

3.5.2 The aggregate shall not contain more than 5 weight percent chert or other known stripping material.

3.5.3 Gradation shall be according to ASTM D 448, Size 7 with the addition that not more than 1 weight percent shall pass the No. 50 sieve.

3.5.4 The aggregate shall be essentially free of deleterious material such as thin elongated pieces, dirt, dust, and shall contain not more than 1 weight percent water (ASTM C566).

3.6 Tack Coat (Methods A and B) : The tack coat shall be applied as shown on the plans, in the specifications, or as directed by the Contracting Officer. Application shall be according to materials and methods specified in TACK COATS.

3.7 Certifications and Submittals : Prior to application, the Contractor shall submit certification of specification compliance for all materials to be used in the work. The Contracting Officer reserves the right to sample and test any materials used in the work. Certification shall be submitted concerning the design of the asphalt-rubber blend as follows :

3.7.1 Method A. The Contractor shall submit certification that the asphalt cement is compatible with the rubber and has been tested to determine the quantity of extender oil (usually 1 to 7 weight percent) required and that the proposed percentage will produce an absolute viscosity of the blended materials of 600 to 2,000 poises at 140 degrees F when tested in accordance with the requirements of AASHTO T 202. New certifications will be required if the asphalt cement lot or source of rubber is changed.

3.7.2 Method B. The Contractor shall submit certifications that the asphalt cement is compatible with the rubber. New certifications will be required if the asphalt cement lot or rubber source is changed.

3.7.3 For either method, the Contractor shall submit information (that will vary with location) that shows, to the satisfaction of the Contracting Officer, that the asphalt-rubber and aggregate combination proposed for the project will not be subject to water stripping in the environmental exposure of the project.

4. EQUIPMENT :

4.1 Preblending : Rubber and a portion of the asphalt for the asphalt-rubber blend shall be preblended in a master batch prior to introduction of the master batch to the distributor. The master batch can be diluted with additional asphalt and additives in the distributor to the formulation recommended by the Supplier

4.2 Distributor : At least one pressure type bituminous distributor in good condition will be required. The distributor shall be equipped so as to be capable of even heating of the material up to 425 degrees F, have adequate pump capacity to maintain a high rate of circulation in the tank; have adequate pressure devices and suitable manifolds to provide constant positive cut-off to prevent dripping from the nozzles. The distributor bar shall be fully circulating with nipples and valves so constructed that they are in such intimate contact with the circulating asphalt that the nipples will not become partially plugged with congealing asphalt upon standing, thereby causing streaked or irregulat distribution of the asphalt-rubber.

4.2.1 Any distributor that produces a streaked or irregular distribution of the material shall be promptly removed from the project. Distributor equipment shall include a tachometer, pressure gages, volume measuring devices, and a thermometer for reading temperature of tank contents. The asphalt-rubber sections shall be so constructed that uniform applications may be made at the specified rate per square yard within a tolerance of plus or minus 0.03 gallons per square yard. It is suggested that the distributors used for Method B be equipped with mechanical mixing devices.

4.3 Chip Spreader : A self propelled chip spreader in good condition and of sufficient capacity to apply the aggregate within the time period specified will be required. The spreader shall be so constructed that it can be accurately gauged and set to uniformly distribute the required amount of aggregate at regulated speed.

4.4 Brooms : Revolving and drag brooms shall be so constructed as to sweep clean or redistribute aggregate without damage to the surface.

4.5 Power Rollers : There shall be at least one self-propelled steel wheel roller rated at 5 t0 8 tons capacity for each mile or fraction thereof of 12-foot wide surfacing or interlayer applied per day. The rollers shall have a weight of not less than 200 pounds to the lineal inch of drum.

4.6 Pneumatic Tire Rollers : There shall be at least three multiple wheel pneumatic self-propelled rollers with provisions for loading to at least 8 tons and at a tire inflation pressure as required by the Contracting Officer with a minimum 3,000 pounds per wheel.

4.7 Trucks : Trucks of sufficient number and size to adequately supply the material will be required. Trucks shall be properly equipped for use with the chip spreader.

4.8 Municipal Type Street Sweeper : If the Contractor intends to put traffic on the asphalt-rubber surface treatment or interlayer, it may be necessary to sweep the surface with a Municipal Type Street Sweeper to pick up and remove stone and dust lodged in the surface prior to further applications of paving materials onto the asphalt-rubber.

5. CONSTRUCTION DETAILS :

5.1 Preparation of Binder, Method A

5.1.1 Preparation of Asphalt-Extender Oil Mix Blend : Blend the preheated asphalt cement (250 to 400 degrees F), and sufficient rubber extender oil (1 to 7 weight percent) to reduce the viscosity of the asphalt cement-extender oil blend to within the specified viscosity range. Mixing shall be thorough by recirculation, mechanical stirring, air agitation, or other appropriate means. A minimum of 400 gallons of the asohalt cement-extender oil blend shall be prepared before introduction of the rubber.

5.1.2 Preparation of Asphalt-Rubber Binder : The asphalt-extender oil blend shall be heated to within the range of 350 to 425 degrees F. The asphalt-rubber blend for the master batch shall be preblended in appropriate preblending equipment, as specified by the Supplier, prior to introduction of the master batch into the distributor. Addition of asphalt cement into the distributor to provide the specified formula shall be as directed by the Supplier. The percentage of rubber shall be 20 to 24 weight percent of the total blend as specified by the Supplier. Recirculation shall continue for a minimum of 30 minutes after all the rubber is incorporated to insure proper mixing and dispersion. Sufficient heat shall be applied to maintain the temperature of the blend between 375 and 425 degrees F while mixing. Viscosity of the asphalt-rubber shall be less than 4,000 centipoises at the time of application (ASTM D 2994 with the use of a Haake type viscometer allowed in lieu of a Brookfield Model LVF or LVT if desired).

5.2 Preparation of Binder, Method B :

5.2.1 Preparation of the Asphalt-Rubber Blend - Mixing : The asphalt cement shall be preheated to within the range of 350 to 450 degrees F. The asphalt-rubber blend for the master batch shall be preblended in appropriate preblending equipment as specified by the Supplier prior to introduction of the master batch into the distributor. Addition of asphalt cement and diluent into the distributor to provide the specified formula shall be as directed by the Supplier. The percentage of rubber shall be 20 to 24 weight percent of the total asphalt-rubber mixture (including diluent) Mixing and recirculation

shall continue until the consistency of the mixture approaches that of a semi-fluid material (i.e., reaction is complete). At the lower temperature, it will require approximately 30 minutes for the reaction to take place after the start of the addition of rubber. At the higher temperature, the reaction will take place within approximately 5 minutes; therefore, the temperature used will depend on the type of application and the methods used by the Contractor. Viscosity of the asphalt-rubber shall be less than 4,000 centipoises at the time of application (ASTM D 2994 with the use of a Haake type viscometer allowed in lieu of a Brookfield Model LVF or LVT if desired). After reaching the proper consistency, application shall proceed immediately.

5.2.2 Adjustment to Spraying Viscosity With Diluent : After the full reaction described in Preparation of Binder, Method A, above has occurred, the mixture can be diluted with a kerosene type diluent. The amount of diluent used shall be less than 7.5 percent by volume of the hot asphalt-rubber composition as required for adjusting viscosity for spraying or better wetting of the cover aggregate. Temperature of the hot composition shall not exceed the kerosene initial boiling point at the time of adding the diluent.

5.3 Job Delays : Prior to preparation or use of asphalt-rubber (Prepared by either Method A or B), maximum holdover times due to job delays (time of application after completion of reaction) to be allowed will be agreed upon between the Contractor, Supplier, and the Contracting Officer. However, holdover times in excess of 16 hours will not be allowed at temperatures above 290 degrees F. Retempering by the addition of heat, asphalt, or diluents (kerosene/extender oil) will be allowed with approval of the Contracting Officer.

5.4 Seasonal and Weather Limitations : Placement of the asphalt-rubber surface treatment or interlayer shall be made only under the following conditions :

5.4.1 Ambient air temperature is above 60 degrees F and rising.

5.4.2 The surface to receive the asphalt-rubber is absolutely dry.

5.4.3 Wind conditions are such that a satisfactory membrane application can be achieved.

5.5 Preparation of Surface : Prior to the hot asphalt-rubber application, the entire surface to be treated shall be cleaned as required by sweeping, blowing, and other methods until all dust, mud, clay lumps, and foreign material are removed entirely from the area. Patching may be required. No moisture should be present on the surface to receive the asphalt-rubber application. After cleaning and patching, the surface shall receive a tack coat if required by the Contracting Officer.

5.6 Application of Binder : The material shall be applied at a temperature of 375 to 425 degrees F for Method A and 290 to 350 degrees F for Method B at a rate specified by the Contracting Officer, generally 0.35 to 0.65 gallons per square yard. No shot shall be in excess of a length which can be immediately covered with aggregate. The Contractor is reminded that traffic in the adjacent lane must be protected from oil, stone, and sweepings. Application width may have to be adjusted to protect this traffic.

5.6.1 The application from the distributor shall be stopped when the tank contains less than 300 gallons of blended asphalt-rubber. At all startings, which shall include joints from preceeding applications, intersections, and at junctions with all pavements, etc., a proper junction shall be made to insure that the distributor nozzles are operating at full force when the application begins. Building paper or other suitable devices shall be used to receive the initial application from the nozzles before any material reaches the surface at the joint. The paper or device shall be removed immediately after use without spilling surplus material on the surface. During application of binder, the Contractor shall provide adequate protection to prevent marring or discoloration of pavement, structures, curbs, trees, etc., adjacent to the area being treated.

5.6.2 Longitudinal joints shall be reasonably true to line and parallel to the centerline. Overlap in the application of the binder shall be the minimum to assure complete coverage. Where any construction joint occurs, the treatment of the edges shall be blended so there are no gaps and the elevations are the same and free from ridges and depressions.

5.6.3 When the application of binder is less than the full width of treatment, the aggregates shall be spread only to within 8 inches of the edge of the next application until the binder is applied to the adjacent width. Between shots no substantial quantity of binder shall remain in the spray bars or nozzels.

5.7 Application of Cover Aggregate: The application of aggregate shall follow immediately after the application of binder. The hot application of binder shall not be made further in advance of the spreading of the cover aggregate than can be covered immediately. The distributor and the aggregate spreader shall not be separated by more than 150 feet. Spreading or the aggregate shall be done directly from approved spreaders. Trucks and spreaders shall not drive on the uncovered binder.

5.7.1 The dry aggregate shall be spread uniformly to cover the binder with an amount of mineral aggregate such that no more than one layer of mineral aggregate is applied, this quantity is generally 25 to 40 pounds per square yard but will be as directed by the Contracting Officer. Any deficient areas shall be covered by additional material immediately.

5.7.2 The entire application of cover material shall be rolled as soon as possible after application. Rolling shall continue to be repeated as often as necessary to key cover material thoroughly into the binder over the entire surface. Pneumatic tire rollers (and steel wheel rollers, if directed by the Contracting Officer) shall be used in the sequence and combination which will provide the rolling pattern that results in the best adhesion of the aggregate to the binder and best surface qualities.

5.7.3 Subsequent to the initial application and rolling of cover aggregate the Contractor shall distribute, as many times as is deemed to be necessary, any loose cover aggregate over the surface tp absorb any free binder and cover any area deficient in cover aggregate. Immediately following each such distribution, the Contractor shall roll, with pneumatic rollers, the entire surface treatment or membrane interlayer until the maximum amount of aggregate is embedded in the binder. Such rolling in each case shall not be less than one complete coverage or as many additional coverages as is deemed necessary to properly embed and seat the aggregate. All such rolling shall be performed while the temperature is favorable for seating the aggregate into the binder.

5.7.4 In no case shall there be less than 3 complete coverages with pneumatic tired rollers of the entire surface of the treatment after initial placement.

5.7.5 When the Contracting Officer has determined that the maximum amount of cover aggregate has been embedded, the Contractor shall sweep or otherwise remove all loose material from the entire surface at such time and in such a manner as will not displace any embedded aggregate

5.7.6 The completed asphalt-rubber surface treatment or interlayer shall be allowed to cure for a minimum period as directed by the Contracting Officer prior to paving any final overlays. Traffic will not be permitted on the asphalt-rubber surface treatment or interlayer until it has cured and the embedded cover aggregates are tightly bound into the surface such that they will not be dislodged by traffic.

6. METHOD OF MEASUREMENT : The asphalt-rubber surface treatment or interlayer will be measured by the number of square yards of compacted material in place.

7. BASIS OF PAYMENT : The unit price bid per square yard shall include the cost of furnishing all material, all labor and equipment necessary to complete the work. Payment for patching material and tack coat will be made under the appropriate bid items.

SECTION B-3

POLYMER MODIFIED ASPHALT-RUBBER SURFACE TREATMENT OR INTERLAYER

1 APPLICABLE PUBLICATIONS
2 DESCRIPTION
3 MATERIALS
4 METHOD OF MEASUREMENT
5 BASIS OF PAYMENT

1 APPLICABLE PUBLICATIONS : The publications listed below form a part of this specification to the extent referenced The publications are referred to in the text by basic designation only.

1.1 American Society for Testing and Materials ASTM) Publications.

D 36-76	Softening Point of Bitumen (Ring and Ball Apparatus)
D 113-79	Ductility of Bituminous Materials
D 3407-78	Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements

2. DESCRIPTION : This work involves placement of a polymer modified asphalt-rubber treatment on a prepared pavement surface in accordance with the plans and other specifications.

2.1 This specification incorporates all sections of the specification ASPHALT-RUBBER SURFACE TREATMENT OR INTERLAYER (SECTION D-2) with modifications and amendments that follow.

3. MATERIALS : Materials will comply with the requirements of the above referenced specification, Method B, with the following modifications:

3.1 Composition: The composition of the mixture shall be as follows (Weight percent of the mixture)

Asphalt Cement	80 ± 1 percent
Ground Vulcanized Rubber	17 ± 1 percent
Polymer Modifier	3 ± 0.5 percent *

* The polymer modifier additive shall be as selected by the Supplier of the asphalt-rubber to provide the required mixture properties with approval of the Contracting Officer.

3.2 The modified asphalt-rubber when mixed and reacted at 350 degrees F for 1 hour shall have the following properties:

Properties	Limits	Test Method
Viscosity, 350 degrees F, centipoises	1500-4000	**
Softening Point, degrees F	140 min	ASTM D 36
Ductility, 77 degrees F, 5 cm./min., centimeters	20 min	ASTM D 113
Ductility, 39.2 degrees F, 1 cm./min., centimeters	15 min	ASTM D 113
Resilience, 77 degrees F, percent	15 min	ASTM D 3407

** Haake Rotational Viscometer (5.2.1, Referenced Specification).

3.3 Certification and Submittals: Prior to application, the Contractor shall submit certification of specification compliance for all materials to be used in the work. The Contracting Officer reserves the right to sample and test any materials in the work. Certification shall be submitted concerning the design of the modified asphalt-rubber blend as folows

3.3.1 The Contractor shall submit certifications that the modified asphalt cement is compatible with the rubber. New certifications will be required if the asphalt cement lot or rubber source is changed.

3.3.2 The Contractor shall submit information that shows, to the satisfaction of the Contracting Officer, that the modified asphalt-rubber and aggregate combination proposed for the project will not be subject to water stripping in the environmental exposure of the project.

4. METHOD OF MEASUREMENT : The modified asphalt-rubber surface treatment or interlayer will be measured by the number of square yards of compacted material in place.

5. BASIS OF PAYMENT : The unit price bid per square yard shall include the cost of furnishing all material, all labor and equipment necessary to complete the work. Payment for patching material and tack coat will be made under the appropriate bid items.

SPECIAL PROVISION FOR ASPHALT-RUBBER AND MODIFIED ASPHALT-RUBBER SURFACE TREATMENTS AND INTERLAYERS

1. SPECIFICATION AFFECTED. Section D-2, ASPHALT-RUBBER SURFACE TREATMENT OR INTERLAYER and Section D-2, POLYMER MODIFIED ASPHALT-RUBBER SURFACE TREATMENT OR INTERLAYER.

2. AFFECTED SECTION: 3.5.3 (Gradation). The specification shall be superseeded to read, "Gradation for this project shall be developed by the Contracting Officer and provided to the Contractor at least 30 days prior to placement of the asphalt-rubber or polymer modified asphalt-rubber".

- END -

SECTION B-4

RUBBER FILLED ASPHALT CONCRETE

1. APPLICABLE PUBLICATIONS
2. GENERAL
3. JOB-MIX FORMULA
4. GRANULATED RUBBER
5. AGGREGATES
6. MINERAL FILLER
7. ASPHALT
8. CONSTRUCTION
9. MEASUREMENT AND PAYMENT

1. APPLICABLE PUBLICATIONS : The Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1.1 American Society for Testing and Materials (ASTM) Publications :

C 136-83 Sieve Analysis of Fine and Coarse Aggregates

D 2041-78 *Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.*

2. GENERAL : This work shall consist of furnishing and placing Rubber Filled Asphalt Concrete. This material is a rubber modified asphalt concrete which is a mixture of granulated rubber, asphalt cement, and a mineral aggregate, in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and details shown on the plans or as established by the Contracting Officer.

2.1 Attention is directed to paragraph 5, AGGREGATES, of these specifications. The aggregate gradations are coarse and gap graded, which generally requires addition of a mineral filler to meet the gradation requirements. Rubber filled asphalt concrete is produced and placed with standard equipment. However, a system must be provided for introduction of the granulated rubber and required mineral filler. The system incorporated into the test sections of this project use a patented process and work will be under license agreement with:

All Seasons Surfacing Corporation
2281 116th Avenue N.E., Suite 2 (Telephone 206-454-3830)
Bellevue, Washington 98004-3015

The Contractor will be responsible for aquiring all licence agreements for the use of this material for this project.

3. JOB-MIX FORMULA (JMF): After a representative quantity of aggregate has been produced and not less than 15 calendar days before production of the rubber filled asphalt concrete mixture begins, the Contractor shall submit to the Contracting Officer a proposed job-mix formula for approval. Representative samples of the stockpiled aggregates, asphalt, and rubber shall be taken and a final job-mix formula established by the Contracting Officer, based on laboratory design procedures approved by the licensor. Note that conventional mixture design procedures have not been found effective for the design of rubber filled asphalt concretes. The mixture design procedure for developing the job-mix formula will require approval of the Contracting Officer

3.1 The job-mix formula shall include definite single values for:

A. The percentage of aggregate passing each specified sieve based on the dry weight of the total aggregate.

B. The percentage of asphalt to be added based on the total weight of mixture of rubber filled asphalt concrete.

C. The granulated rubber percentage shall be 3 percent based on the total weight of mixture of rubber filled asphalt concrete

3.2 In addition to the aggregate sample(s) furnished above, the Contractor shall furnish the Contracting Officer with 1 gallon of the proposed asphalt cement and 10 pounds of the granulated rubber meeting the requirements of the following paragraphs.

3.3 Should a change of any materials be found necessary, a new job-mix formula will be required to be established in the same manner as described previously.

3.4 All rubber filled asphalt concrete mixture furnished shall conform to the job-mix formula within the following range of tolerances:

Sieve Size (ASTM C 136)	Percent Passing
3/8 or 1/4 in.	JMF ± 6
No. 10 or No. 30	JMF ± 4
No. 200	JMF ± 0.5

Other Constituents	Range
Asphalt Cement	JMF ± 0.4 percent
Granulated Rubber	JMF ± 0.15 percent *

* Not determinable by conventional extraction testing

4. GRANULATED RUBBER : The granulated rubber shall be ground from whole passenger car or truck tires only. Heavy equipment tires or other non-automotive rubber shall not be used.

4.1 The rubber shall be cubical or thread-shaped and individual rubber particles, irrespective of diameter, shall not be greater in length than 5/16 inch. The granulated rubber shall conform to the following gradation requirements (ASTM C 136) :

Sieve Size	Percent Passing
1/4 in.	100
No. 4	76-100
No. 10	28-42
No. 20	16-24

4.2 Maximum allowable moisture content is 2 percent by weight of rubber.

4.3 The Contractor shall furnish written certification of compliance with these specifications. In addition, each delivery shall be sampled at the rate of not less than 1 sample for each 20 tons of rubber and a dry sieve analysis performed to insure that the rubber granules meet gradation and size requirements. The sampling and testing must be completed and the rubber approved for use by the Contracting Officer before any delivery is incorporated into the rubber filled asphalt concrete.

5. AGGREGATES : Aggregates shall conform to the requirements in Section 3A, BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRFIELDS, HELIPORTS, AND HEAVY DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX).

5.1 Gradation Requirements (ASTM C 136)

	Percent Passing		
Sieve Size	Gradation 8	Gradation 12	Gradation 16
3/4"			100
5/8"		100	--
3/8"	100	60-80	50-62
1/4"	60-80	30-44	30-44
No. 10	23-38	20-32	20-32
No. 30	15-27	13-25	12-23
No. 200	8-12	8-12	7-11

5.1.1 The rubber filled asphalt concrete must be gap graded to allow space for the rubber granules. For gradation 12 and 16 mixtures, this gap grade is defined by restricting the amount of aggregate passing the 1/4 inch sieve and retained on the No. 10 sieve to be 12 percent plus or minus 4 percent.

5.2 Before being fed to the dryer, the aggregate shall be separated into 2 or more sizes and stored separately. Sizing of the separated material shall be with the approval of the Contracting Officer. In placing aggregate into storage or in moving from storage to cold feed bins, any method that causes segregation, degradation, or the combining of materials of different gradings shall not be permitted. Any segregated, degraded, or contaminated material shall be rescreened or wasted

6. MINERAL FILLER : A mineral filler is usually required to meet the minus No. 200 gradation requirements. The Contractor shall submit a representative sample of the mineral filler material to the Contracting Officer for approval and use in establishing the final job-mix formula. The plant shall be equipped to feed the mineral filler into the mixer with a precision of plus or minus 0.5 percent of the job-mix formula requirement.

7. ASPHALT : Asphalt type and grade shall be the same material specified in Section 3A, BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRFIELDS, HELIPORTS, AND HEAVY DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX).

7.1 The asphalt content (percent by total weight of rubber filled asphalt concrete) shall be within the following ranges :

Gradation 8	Gradation 12	Gradation 16
8.0 - 9.5	7.5 - 9.0	7.5 - 9.0

Actual asphalt content will be determined by the mixture design.

8. CONSTRUCTION :

8.1 Bituminous Mixing Plants : Mixing plants shall conform to the standard requirements found in Section 3A, BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRFIELDS, HELIPORTS, AND HEAVY DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX), except that the following shall be added :

8.1.1 Requirements for Batch Plants : The amount of granulated rubber incorporated into the rubber filled asphalt concrete shall be determined by weighing on springless dial scales, or by a method which uniformly feeds the mixer within plus or minus 0.15 percent of the required amount indicated in paragraph JOB-MIX FORMULA. Bags of granulated rubber may be used for proportioning provided the batch size is adjusted to use the entire bag of rubber. No partial bags will be allowed.

8.1.2 Requirements for Drum Mixing Plants : Granulated rubber introduced into the mixer shall be drawn from storage bins by a continuous mechanical feeder which will uniformly feed the mixer within plus or minus 0.15 percent of the required amount indicated in paragraph JOB-MIX FORMULA. The continuous feed system shall have a ready means of

accurately calibrating the system. A means satisfactory to the Contracting Officer shall be provided to insure positive interlocking control between the flow of the granulated rubber and aggregates introduced into the rubber filled asphalt concrete. The plant shall be equipped with a heat shield or other means satisfactory to the Contracting Officer to prevent direct contact of the open flame and rubber.

8.2 Mixing: The Contractor shall prepare a work plan describing the planned procedures for mixing and placing the material. The plan shall include such details as the method of introducing the rubber granules into the mixture, mixing times, temperatures, and other equipment for production of the rubber filled asphalt concrete.

8.2.1 The plant shall be calibrated to produce the required composition of asphalt, rubber, aggregate, and mineral filler. Aggregate samples shall be taken in a manner satisfactory to the Contracting Officer to verify that the mixture is within the combined aggregate gradation specifications before beginning job-mix production.

8.2.2 Standard mixing procedures as found in Section 3A, BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRFIELDS, HELIPORTS, AND HEAVY-DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX) shall apply except as follows:

8.2.2.1 For batch plants, aggregates and granulated rubber shall be combined and mixed thoroughly for a minimum of 15 seconds prior to the introduction of asphalt. The asphalt, aggregates, and rubber granules shall be mixed so as to achieve a uniform distribution of all materials and coating of the aggregate and granulated rubber.

8.2.2.2 The completed mixture shall conform to the job-mix formula within the requirements of paragraph JOB-MIX FORMUA. If the mixture is outside the tolerance limits for 2 consecutive samples, a plant and/or aggregate adjustment must be made to bring the mixture within the specified tolerance limits.

8.2.2.3 The temperature at mixing shall be between 325 and 375 degrees F. The temperature of the mixture at discharge shall be above 300 degrees F for both batch and drum mixing plants.

8.3 Hauling, Spreading, and Finishing

8.3.1 The standard requirements of Section 3A, BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRPORTS, HELIPORTS, AND HEAVY-DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX) shall apply. When directed by the Contracting Officer, the mixture shall be covered with appropriate means to prevent rapid cooling of the mixture.

8.3.2 The mixture shall be placed at temperatures of not less than 300 degrees F when measured at the paving machine. Maximum compacted lift thickness shall be 2 inches.

8.3.3 A tack coat shall be applied at a rate of 0.06 to 0.08 gallons per square yard of residual asphalt in accordance with the Section TACK COAT.

8.3.4 The mixture shall be laid upon a surface approved by the Contracting Officer, spread, and struck to grade with a self-propelled asphalt paver conforming to the requirements of Section 3A, BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRPORTS, HELIPORTS, AND HEAVY-DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX). The mixture shall not be placed when it is raining or on a wet surface, or when the average ground temperature is less than 45 degrees F or when the Contracting Officer determines that weather conditions prevent proper handling or finishing. Where hand placement or raking is required, it shall be done immediately because the mixture becomes stiff and difficult to rake at lowered temperatures. If the mixture is produced by more than 1 asphalt plant, the material produced at each plant shall be placed by separate spreading and compacting equipment.

8.4 Compaction: Rollers and compaction procedures shall conform with the requirements of Section 3A, BITUMINOUS INTERMEDIATE AND WEARING COURSES FOR AIRFIELDS, HELIPORTS, AND HEAVY-DUTY PAVEMENTS (CENTRAL-PLANT HOT-MIX) with the following supplements:

8.4.1 Breakdown compaction shall begin immediately behind the paving machine. However, some delay may be required to prevent roller pickup. The roller drums must be kept well watered and a wetting agent may be necessary to decrease roller pickup.

8.4.2 Breakdown compaction shall be accomplished using a 10 to 12 ton vibrating or static steel wheel roller. An 8 to 10 ton tandem steel roller shall be used for finish rolling. Finish rolling of the mat shall continue

until elastic movement under the roller is no longer observed.

8.4.3 Rolling procedures shall be established with a control strip to determine equipment and number of coverages necessary to obtain required density. The target density, as a percentage of maximum theoretical density (ASTM D 2041) shall be 95 to 98 percent to provide 2 to 5 percent air voids.

9. MEASUREMENT AND PAYMENT : Measurement of rubber filled asphalt concrete shall be by the ton, compacted in place, and will include the granulated rubber, aggregates, mineral filler, asphalt, and other components in the mixture.

9.1 The contract unit price per ton for rubber filled asphalt concrete shall be full compensation for furnishing all labor, equipment, materials, supplies, and royalties or licences required for the construction and placement of this material as specified

SECTION B-5

POLYPROPYLENE PAVEMENT REINFORCING FABRIC

1. APPLICABLE DOCUMENTS : The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1.1 American Society for Testing and Materials (ASTM) Publications.

D 1682-64 Test Methods for Breaking Load and Elongation of Textile Fabrics

1.2 American Association of State Highway and Transportation Officials (AASHTO) Publications.

M 20-70 Penetration Graded Asphalt Cement

M 226-80 Viscosity Graded Asphalt Cement

2. GENERAL : This work shall consist of furnishing and placing a polypropylene pavement reinforcing fabric. This material and an accompanying asphalt sealant binder is to be placed in accordance with these specifications and in reasonably close conformity with the lines, grades, application rates, and details shown on the plans or as established by the Contracting Officer.

3. POLYPROPYLENE PAVEMENT REINFORCING FABRIC : Fabric shall be a 100 percent needle-punched non-woven polypropylene pavement reinforcing fabric which conforms to the following properties based on ASTM D 1682, Method D, Grab Method :

Property	Minimum
Weight, ounces per square yard	3.8
Tensile Strength, pounds	90
Elongation-at-Break, percent	55
Asphalt Retention, gallons per square yard	0.20
Color	Black
Width, inches	75 or 150 (option)
Length per Roll, yards	120

4. ASPHALT SEALANT OR BINDER : Asphalt cement sealant or binder shall conform to AASHTO M 20 (TABLE 1) OR M 226 (TABLE 1 OR 3). Emulsified asphalts can be used with the approval of the Contracting Officer. Grades of asphalt will be determined by the Contracting Officer.

5. FABRIC HANDLING EQUIPMENT : Mechanical laydown equipment shall be capable of handling full rolls of fabric, and shall be capable of laying the fabric smoothly and without excessive wrinkles and/or folds. Specific requirements of the Supplier are included as a part of these specifications

6. ASPHALT DISTRIBUTOR : The distributor must be capable of spraying the asphalt binder at the prescribed temperature and application rate. It must be adjustable to give a uniform spray pattern over the entire width of application. A hydrostatic distributor is preferred. No drilling or skipping is permitted. As directed by the Contracting Officer, preliminary test applications may be required at an off-site area to insure proper distributor and operator performance.

7. CONSTRUCTION :

7.1 Surface Preparation : The surface to receive the polypropylene pavement reinforcing fabric must be free of dirt, water, and vegetation. Cracks or joints between 1/8 and 1/4 inch will be filled with a crack filler approved by the Contracting Officer. Larger cracks, joints, or holes are to be repaired with an approved hot ot cold asphalt mixture prior to placement of the polypropylene pavement reinforcing fabric. Leveling courses are a separate item.

7.2 Application of Asphalt Sealant or Binder. The asphalt sealant or binder must be uniformly applied at the rate specified by the Contracting Officer. Quantity specified will vary with porosity of the underlying substrate, but in most cases, will be in the range of 0.25 to 0.30 gallons per square yard residual asphalt. Application must be by distributor as previously specified. Temperature of the asphalt sealant or binder must be sufficiently high to permit a uniform spray pattern. For asphalt cement, the minimum spray temperature is 300 degrees F For emulsified asphalts, the minimum spray temperature shall conform to the recommendations of the emulsion manufacturer. If emulsified asphalt is used as the binder or sealant, the emulsion must be cured as per recommendations of the fabric Supplier prior to placing the polypropylene pavement reinforcing fabric.

7.3 Fabric Placement: The fabric shall be placed into the asphalt binder or sealant with a minimum of wrinkles. Brooming may be required to maximize fabric contact with the underlying substrate or surface. As directed by the Contracting Officer, if fabric folds exist, the fabric shall be slit and allowed to lay flat. Additional binder may be required to satisfy the double layer. All joints should overlap adjacent fabric by 2 to 6 inches. Transverse joints should be shingled in the direction of paving to prevent edge pickup by the paver. Paving operations should follow directly behind fabric placement under direction of the Contracting Officer. Removal and replacement of polypropylene pavement reinforcing fabric that is damaged for any reason after placement is the responsibility of the Contractor.

8. MEASUREMENT AND PAYMENT: Measurement of polypropylene pavement reinforcing fabric shall be by the square yard, in place, and will include polypropylene pavement reinforcing fabric and asphalt sealant or binder

8.1 The contract unit price per square yard for polypropylene pavement reinforcing fabric shall be full compensation for furnishing all labor, equipment, materials, supplies, and royalties required for construction of this material as specified.

SECTION B-6

COLD MILLING

1. DESCRIPTION. This work shall consist of cold milling of pavement in accordance with the plans and specifications and as may be directed by the Contracting Officer.

2. EQUIPMENT: The cold milling machine shall be an approved pavement profiler meeting the following minimum criteria:

A. Power operated

B. Accurately establish profile grades with a tolerance of ± 1/8 inch by reference from the existing pavement surface or from an independent grade control with cross-slope elevation control.

C. Capable of cold milling the pavement.

D. Have an enclosed cutting area with an effective means of dust control.

3. CONSTRUCTION REQUIREMENTS

3.1 The existing pavement surface shall be cold milled to the depth, width, and grades as shown on the plans or as established by the Contracting Officer.

3.2 Any adjustment to the plan depth and/or depth established by the Contracting Officer shall be adjusted in 1/4 inch increments. Said increments may be plus or minus and shall be effected whenever and wherever the Contracting Officer deems an adjustment in the work is necessary. The Contracting Officer shall be the sole judge as to said adjustments. The aforementioned adjustment(s) will be made to the established profile grades from the existing pavement surface or from an independent grade control with cross-slope elevation control.

3.3 Excessive grooving by cold milling will not be permitted

3.3.1 Excessive grooving for all intents and purposes of these specifications is defined as a variation in the milled surface in excess of 1/2 inch from the high point to the low point across the width of the cutting head of the milling machine. Measurement shall be made to the bottom of the groove from a straightedge or cutting stringline datum plane

3.3.2 When excess grooving occurs, cold milling operations shall cease and the cold milling equipment corrected. Prior to resuming cold milling operations, all nonconforming work shall be corrected to the satisfaction of the Contracting Officer at no additional cost to the Government.

3.3.3 The pavement material eminating from the cold milling operation shall be removed and disposed of as directed by the Contracting Officer.

3.4 This project requires that all longitudinal and transverse surfaces (edges) be milled in such a manner that a slope or bevel of 3 inches vertically to 6 feet horizontally for 6 feet horizontally be prepared to allow passage of aircraft across the milled surface after milling is complete as part of this specification.

4.5 After milling, all loose material that could cause foreign object damage (FOD) shall be removed to the satisfaction of the Contracting Officer. Hand removal and brooming may be necessary

4. METHOD OF MEASUREMENT : Cold milling of existing pavement surfaces will be measured by the square yard inch. A square yard inch is defined as one square yard by one inch deep for purposes of these specifications

5. BASIS OF PAYMENT : The unit price bid per square yard inch shall be full compensation for removing of the cold milled pavement surface material and hauling said material a maximum of five miles for disposal and for furnishing all equipment, tools, labor, materials, and incidentals necessary to complete the work provided herein

Appendix C

Preconstruction Evaluation Data

Evaluation Date : Pre-Construction.
Portland Cement Concrete Base.

Section : 1 (A-R)

From	To	Pre–Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
0	25	341	341	100.0	0.195	100.0
25	50	459	459	100.0	0.262	100.0
50	75	445	445	100.0	0.254	100.0
75	100	321	321	100.0	0.183	100.0
100	125	272	272	100.0	0.155	100.0
125	150	277	277	100.0	0.158	100.0
150	175	234	234	100.0	0.134	100.0
175	200	308	308	100.0	0.176	100.0
200	225	259	259	100.0	0.148	100.0
225	250	219	219	100.0	0.125	100.0
250	275	282	282	100.0	0.161	100.0
Section Totals		3417	3417	NA	1.953	NA

Section : 2 (Mod. A-R)

From	To	Pre–Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
275	300	289	289	100.0	0.165	100.0
300	325	212	212	[illegible]	0.121	100.0
325	350	292	292	100.0	0.167	100.0
350	375	300	300	100.0	0.171	100.0
375	400	243	243	100.0	0.139	100.0
400	425	336	336	100.0	0.192	100.0
425	450	204	204	100.0	0.117	100.0
450	475	241	241	100.0	0.138	100.0
475	500	285	285	100.0	0.163	100.0
500	525	188	188	100.0	0.107	100.0
525	550	106	106	100.0	0.061	100.0
Section Totals		2696	2696	NA	1.541	NA

Section : 3 (Fabric)						
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
550	575	115	115	100.0	0.066	100.0
575	600	74	74	100.0	0.042	100.0
600	625	57	57	100.0	0.033	100.0
625	650	85	85	100.0	0.049	100.0
650	675	68	68	100.0	0.039	100.0
675	700	89	89	100.0	0.051	100.0
700	725	74	74	100.0	0.042	100.0
725	750	90	90	100.0	0.051	100.0
750	775	57	57	100.0	0.033	100.0
775	800	84	84	100.0	0.048	100.0
800	825	199	199	100.0	0.114	100.0
Section Totals		992	992	NA	0.567	NA

Section : 4 (Control, A.C.)						
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
825	850	252	252	100.0	0.144	100.0
850	875	299	299	100.0	0.171	100.0
875	900	264	264	100.0	0.151	100.0
900	925	224	224	100.0	0.128	100.0
925	950	284	284	100.0	0.162	100.0
950	975	374	374	100.0	0.214	100.0
975	1000	369	369	100.0	0.211	100.0
1000	1025	304	304	100.0	0.174	100.0
1025	1050	311	311	100.0	0.178	100.0
1050	1075	393	393	100.0	0.225	100.0
1075	1100	537	537	100.0	0.307	100.0
Section Totals		3611	3611	NA	2.063	NA

Section : 5 (RFAC)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1100	1125	476	476	100.0	0.272	100.0
1125	1150	215	215	100.0	0.123	100.0
1150	1175	209	209	100.0	0.119	100.0
1175	1200	227	227	100.0	0.130	100.0
1200	1225	250	250	100.0	0.143	100.0
1225	1250	274	274	100.0	0.157	100.0
1250	1275	324	324	100.0	0.185	100.0
1275	1300	228	228	100.0	0.130	100.0
1300	1325	329	329	100.0	0.188	100.0
1325	1350	327	327	100.0	0.187	100.0
1350	1375	353	353	100.0	0.202	100.0
Section Totals		3212	3212	NA	1.835	NA

Section : 6 (Sawed)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1375	1400	100	100	100.0	0.057	100.0
1400	1425	200	200	100.0	0.114	100.0
1425	1450	330	330	100.0	0.189	100.0
1450	1475	396	396	100.0	0.226	100.0
1475	1500	311	311	100.0	0.178	100.0
1500	1525	241	241	100.0	0.138	100.0
1525	1550	281	281	100.0	0.161	100.0
1550	1575	247	247	100.0	0.141	100.0
1575	1600	228	228	100.0	0.130	100.0
1600	1625	308	308	100.0	0.176	100.0
1625	1650	291	291	100.0	0.166	100.0
Section Totals		2933	2933	NA	1.676	NA

Section : 7 (Sawed)						
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
1650	1675	211	211	100.0	0.121	100.0
1675	1700	315	315	100.0	0.180	100.0
1700	1725	253	253	100.0	0.145	100.0
1725	1750	242	242	100.0	0.138	100.0
1750	1775	221	221	100.0	0.126	100.0
1775	1800	222	222	100.0	0.127	100.0
1800	1825	205	205	100.0	0.117	100.0
1825	1850	234	234	100.0	0.134	100.0
1850	1875	350	350	100.0	0.200	100.0
1875	1900	205	205	100.0	0.117	100.0
1900	1925	310	310	100.0	0.177	100.0
Section	**Totals**	2768	2768	NA	1.582	NA

Section : 8 (Fabric)						
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
1925	1950	287	287	100.0	0.164	100.0
1950	1975	213	213	100.0	0.122	100.0
1975	2000	325	325	100.0	0.186	100.0
2000	2025	159	159	100.0	0.091	100.0
2025	2050	123	123	100.0	0.070	100.0
2050	2075	127	127	100.0	0.073	100.0
2075	2100	143	143	100.0	0.082	100.0
2100	2125	112	112	100.0	0.064	100.0
2125	2150	169	169	100.0	0.097	100.0
2150	2175	141	141	100.0	0.081	100.0
2175	2200	165	165	100.0	0.094	100.0
Section	**Totals**	1964	1964	NA	1.122	NA

Section : 9 (RFAC)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
2200	2225	347	347	100.0	0.198	100.0
2225	2250	309	309	100.0	0.177	100.0
2250	2275	243	243	100.0	0.139	100.0
2275	2300	284	284	100.0	0.162	100.0
2300	2325	299	299	100.0	0.171	100.0
2325	2350	222	222	100.0	0.127	100.0
2350	2375	260	260	100.0	0.149	100.0
2375	2400	258	258	100.0	0.147	100.0
2400	2425	174	174	100.0	0.099	100.0
2425	2450	286	286	100.0	0.163	100.0
2450	2475	253	253	100.0	0.145	100.0
Section Totals		2935	2935	NA	1.677	NA

Section : 10 (A-R)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
2475	2500	183	183	100.0	0.105	100.0
2500	2525	216	216	100.0	0.123	100.0
2525	2550	275	275	100.0	0.157	100.0
2550	2575	211	211	100.0	0.121	100.0
2575	2600	271	271	100.0	0.155	100.0
2600	2625	268	268	100.0	0.153	100.0
2625	2650	179	179	100.0	0.102	100.0
2650	2675	280	280	100.0	0.160	100.0
2675	2700	254	254	100.0	0.145	100.0
2700	2725	187	187	100.0	0.107	100.0
2725	2750	237	237	100.0	0.135	100.0
Section Totals		2561	2561	NA	1.463	NA

Section : 11 (Control, A.C.)						
		Pre–Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
2750	2775	220	220	100.0	0.126	100.0
2775	2800	201	201	100.0	0.115	100.0
2800	2825	233	233	100.0	0.133	100.0
2825	2850	265	265	100.0	0.151	100.0
2850	2875	197	197	100.0	0.113	100.0
2875	2900	244	244	100.0	0.139	100.0
2900	2925	245	245	100.0	0.140	100.0
2925	2950	202	202	100.0	0.115	100.0
2950	2975	269	269	100.0	0.154	100.0
2975	3000	247	247	100.0	0.141	100.0
3000	3025	196	196	100.0	0.112	100.0
Section Totals		2519	2519	NA	1.439	NA

Section : 12 (Mod. A-R)						
		Pre–Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3025	3050	223	223	100.0	0.127	100.0
3050	3075	249	249	100.0	0.142	100.0
3075	3100	218	218	100.0	0.125	100.0
3100	3125	297	297	100.0	0.170	100.0
3125	3150	237	237	100.0	0.135	100.0
3150	3175	170	170	100.0	0.097	100.0
3175	3200	227	227	100.0	0.130	100.0
3200	3225	150	150	100.0	0.086	100.0
3225	3250	83	83	100.0	0.047	100.0
3250	3275	183	183	100.0	0.105	100.0
3275	3300	157	157	100.0	0.090	100.0
Section Totals		2194	2194	NA	1.254	NA

Soil Cement Base.

Section : 13 (A-R)						
From	To	Pre-Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
3300	3325	1375	1375	100.0	0.786	100.0
3325	3350	750	750	100.0	0.429	100.0
3350	3375	400	400	100.0	0.229	100.0
3375	3400	750	750	100.0	0.429	100.0
3400	3435	900	900	100.0	0.367	100.0
Section Totals		4175	4175	NA	2.239	NA

Section : 14 (Control, A.C.)						
From	To	Pre-Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
3435	3460	1400	1400	100.0	0.800	100.0
3460	3485	1300	1300	100.0	0.743	100.0
3485	3510	1000	1000	100.0	0.571	100.0
3510	3535	1100	1100	100.0	0.629	100.0
3535	3570	1200	1200	100.0	0.490	100.0
Section Totals		6000	6000	NA	3.233	NA

Section : 15 (RFAC)						
From	To	Pre-Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
3570	3595	1400	1400	100.0	0.800	100.0
3595	3620	1325	1325	100.0	0.757	100.0
3620	3645	1225	1225	100.0	0.700	100.0
3645	3670	1100	1100	100.0	0.629	100.0
3670	3705	1200	1200	100.0	0.490	100.0
Section Totals		6250	6250	NA	3.376	NA

Section : 16 (FABRIC)						
From	To	Pre–Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
3705	3730	1325	1325	100.0	0.757	100.0
3730	3755	1375	1375	100.0	0.786	100.0
3755	3780	1250	1250	100.0	0.714	100.0
3780	3805	1300	1300	100.0	0.743	100.0
3805	3840	850	850	100.0	0.347	100.0
Section Totals		6100	6100	NA	3.347	NA

Section : 17 (Mod. A-R)						
From	To	Pre–Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
3840	3865	1200	1200	100.0	0.686	100.0
3865	3890	1175	1175	100.0	0.671	100.0
3890	3915	1200	1200	100.0	0.686	100.0
3915	3940	1300	1300	100.0	0.743	100.0
3940	3975	1350	1350	100.0	0.551	100.0
Section Totals		6225	6225	NA	3.337	NA

Section : 18 (A-R)						
From	To	Pre–Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
3975	4000	1250	1250	100.0	0.714	100.0
4000	4025	1300	1300	100.0	0.743	100.0
4025	4050	1250	1250	100.0	0.714	100.0
4050	4075	1325	1325	100.0	0.757	100.0
4075	4110	1375	1375	100.0	0.561	100.0
Section Totals		6500	6500	NA	3.490	NA

Section : 19 (Control A.C.)						
From	To	Pre–Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
4110	4135	1400	1400	100.0	0.800	100.0
4135	4160	1300	1300	100.0	0.743	100.0
4160	4185	1375	1375	100.0	0.786	100.0
4185	4210	1325	1325	100.0	0.757	100.0
4210	4245	1350	1350	100.0	0.551	100.0
Section Totals		6750	6750	NA	3.637	NA

Section : 20 (Fabric)						
From	To	Pre–Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
4245	4270	1300	1300	100.0	0.743	100.0
4270	4295	1250	1250	100.0	0.714	100.0
4295	4320	1275	1275	100.0	0.729	100.0
4320	4345	1250	1250	100.0	0.714	100.0
4345	4380	1375	1375	100.0	0.561	100.0
Section Totals		6450	6450	NA	3.461	NA

Section : 21 (Mod A-R)						
From	To	Pre–Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
4380	4405	1100	1100	100.0	0.629	100.0
4405	4430	1225	1225	100.0	0.700	100.0
4430	4455	1200	1200	100.0	0.686	100.0
4455	4480	1100	1100	100.0	0.629	100.0
4480	4515	1250	1250	100.0	0.510	100.0
Section Totals		5875	5875	NA	3.153	NA

Section : 22 (RFAC)						
From	To	Pre-Const. Sq. Ft.	Meas. Tot. Sq. Ft.	Calc. Tot. % Pre-Const.	Meas. Rel. Sq./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
4515	4540	1200	1200	100.0	0.686	100.0
4540	4565	1250	1250	100.0	0.714	100.0
4565	4590	1075	1075	100.0	0.614	100.0
4590	4615	900	900	100.0	0.514	100.0
4615	4650	750	750	100.0	0.306	100.0
Section Totals		5175	5175	NA	2.835	NA

Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	341	289	115	252	476	100
25-50	459	212	74	299	215	200
50-75	445	292	57	264	209	330
75-100	321	300	85	224	227	396
100-125	272	243	68	284	250	311
125-150	277	336	89	374	274	241
150-175	234	204	74	369	324	281
175-200	308	241	90	304	228	247
200-225	259	285	57	311	329	228
225-250	219	188	84	393	327	308
250-275	282	106	199	537	353	291
Total	3417	2696	992	3611	3212	2933
Σ y^2	1122927	703176	105202	1261425	1002326	842017
Mean	310.6	245.1	90.2	328.3	292.0	266.6
SDev (S)	78.4	65.1	39.7	87.2	80.3	77.4
2S	156.8	130.2	79.4	174.4	160.5	154.9
X+2S	467.5	375.3	169.5	502.7	452.5	421.5
X-2S	153.8	114.8	10.8	153.9	131.5	111.8

Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary, Continued

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	211	287	347	183	220	223
25-50	315	213	309	216	201	249
50-75	253	325	243	275	233	218
75-100	242	159	284	211	265	297
100-125	221	123	299	271	197	237
125 150	222	127	222	268	244	170
150-175	205	143	260	179	245	227
175-200	234	112	258	280	202	150
200-225	350	169	174	254	269	83
225-250	205	141	286	187	247	183
250-275	310	165	253	237	196	157
Total	2768	1964	2935	2561	2519	2194
Σ y^2	721850	398562	804525	611651	584275	471588
Mean	251.6	178.5	266.8	232.8	229.0	199.5
SDev (S)	50.3	69.2	46.3	39.2	27.2	58.3
2S	100.6	138.4	92.5	78.5	54.5	116.6
X+2S	352.3	317.0	359.4	311.3	283.5	316.0
X-2S	151.0	40.1	174.3	154.3	174.5	82.9

Total Cracks (Lin. Ft.). Portland Cement Concrete Base ANOVA :

$\Sigma\Sigma$ y = 31802

$\Sigma\Sigma$ y^2 = 8629524

CT = 7661873

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	496144	45104	11.48	1.87	2.41
Error	120	471507	3929			
Total	131	967651				

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	0.195	0.165	0.066	0.144	0.272	0.057
25-50	0.262	0.121	0.042	0.171	0.123	0.114
50-75	0.254	0.167	0.033	0.151	0.119	0.189
75-100	0.183	0.171	0.049	0.128	0.130	0.226
100-125	0.155	0.139	0.039	0.162	0.143	0.178
125-150	0.158	0.192	0.051	0.214	0.157	0.138
150-175	0.134	0.117	0.042	0.211	0.185	0.161
175-200	0.176	0.138	0.051	0.174	0.130	0.141
200-225	0.148	0.163	0.033	0.178	0.188	0.130
225-250	0.125	0.107	0.048	0.225	0.187	0.176
250-275	0.161	0.061	0.114	0.307	0.202	0.166
Total	1.953	1.541	0.567	2.063	1.835	1.676
Σ y^2	0.367	0.230	0.034	0.412	0.327	0.275
Mean	0.1775	0.1401	0.0515	0.1876	0.1669	0.1524
SDev (S)	0.0448	0.0372	0.0227	0.0498	0.0459	0.0443
2S	0.0896	0.0744	0.0453	0.0997	0.0917	0.0885
X+2S	0.2671	0.2145	0.0969	0.2872	0.2586	0.2409
X-2S	0.0879	0.0656	0.0062	0.0879	0.0751	0.0639

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary,

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	0.121	0.164	0.198	0.105	0.126	0.127
25-50	0.180	0.122	0.177	0.123	0.115	0.142
50-75	0.145	0.186	0.139	0.157	0.133	0.125
75-100	0.138	0.091	0.162	0.121	0.151	0.170
100-125	0.126	0.070	0.171	0.155	0.113	0.135
125-150	0.127	0.073	0.127	0.153	0.139	0.097
150-175	0.117	0.082	0.149	0.102	0.140	0.130
175-200	0.134	0.064	0.147	0.160	0.115	0.086
200-225	0.200	0.097	0.099	0.145	0.154	0.047
225-250	0.117	0.081	0.163	0.107	0.141	0.105
250-275	0.177	0.094	0.145	0.135	0.112	0.090
Total	1.582	1.122	1.677	1.463	1.439	1.254
Σ y^2	0.236	0.130	0.263	0.200	0.191	0.154
Mean	0.1438	0.1020	0.1525	0.1330	0.1309	0.1140
SDev (S)	0.0288	0.0395	0.0264	0.0224	0.0156	0.0333
2S	0.0575	0.0791	0.0529	0.0449	0.0311	0.0666
X+2S	0.2013	0.1811	0.2054	0.1779	0.1620	0.1806
X-2S	0.0863	0.0229	0.0996	0.0882	0.0997	0.0473

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base ANOVA :

$\Sigma\Sigma$ y = 18.173

$\Sigma\Sigma$ y^2 = 2.818

CT = 2.502

Source	df	SS	MS	F	F(05)	F(01)
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Section	11	0.162	0.015	11.48	1.87	2.41
Error	120	0.154	0.001			
Total	131	0.316				

% Pre-Const., Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary

Section >	1	2	3	4	5	6
0-25	100.0	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0	100.0
100-125	100.0	100.0	100.0	100.0	100.0	100.0
125-150	100.0	100.0	100.0	100.0	100.0	100.0
150-175	100.0	100.0	100.0	100.0	100.0	100.0
175-200	100.0	100.0	100.0	100.0	100.0	100.0
200-225	100.0	100.0	100.0	100.0	100.0	100.0
225-250	100.0	100.0	100.0	100.0	100.0	100.0
250-275	100.0	100.0	100.0	100.0	100.0	100.0
Total	1100.0	1100.0	1100.0	1100.0	1100.0	1100.0
Σ y^2	110000	110000	110000	110000	110000	110000
Mean	100.00	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00	0.00
X+2S	100.00	100.00	100.00	100.00	100.00	100.00
X-2S	100.00	100.00	100.00	100.00	100.00	100.00

% Pre-Const.,Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary Continued.

Section >	7	8	9	10	11	12
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0-25	100.0	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0	100.0
100-125	100.0	100.0	100.0	100.0	100.0	100.0
125-150	100.0	100.0	100.0	100.0	100.0	100.0
150-175	100.0	100.0	100.0	100.0	100.0	100.0
175-200	100.0	100.0	100.0	100.0	100.0	100.0
200-225	100.0	100.0	100.0	100.0	100.0	100.0
225-250	100.0	100.0	100.0	100.0	100.0	100.0
250-275	100.0	100.0	100.0	100.0	100.0	100.0

Total	1100.0	1100.0	1100.0	1100.0	1100.0	1100.0
Σ y^2	110000	110000	110000	110000	110000	110000
Mean	100.00	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00	0.00
X+2S	100.00	100.00	100.00	100.00	100.00	100.00
X-2S	100.00	100.00	100.00	100.00	100.00	100.00

% Pre-Const.,Total Cracks (Lin. Ft.). Portland Cement Concrete Base ANOVA :

ΣΣ y = 13200.0
ΣΣ y^2 = 1320000
CT = 1320000

Source	df	SS	MS	F	F(05)	F(01)
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Section	11	0.0	0.0	#DIV/0!	1.87	2.41
Error	120	0.0	0.0			
Total	131	0.0				

% Pre-Const., Relative Cracks (Sq. Ft./Sq. Ft..). Portland Cement Concrete Base, Summary.

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	100.0	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0	100.0
100-125	100.0	100.0	100.0	100.0	100.0	100.0
125-150	100.0	100.0	100.0	100.0	100.0	100.0
150-175	100.0	100.0	100.0	100.0	100.0	100.0
175-200	100.0	100.0	100.0	100.0	100.0	100.0
200-225	100.0	100.0	100.0	100.0	100.0	100.0
225-250	100.0	100.0	100.0	100.0	100.0	100.0
250-275	100.0	100.0	100.0	100.0	100.0	100.0

Total	1100.0	1100.0	1100.0	1100.0	1100.0	1100.0
Σ y^2	110000	110000	110000	110000	110000	110000
Mean	100.00	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00	0.00
X+2S	100.00	100.00	100.00	100.00	100.00	100.00
X-2S	100.00	100.00	100.00	100.00	100.00	100.00

% Pre-Const.,Relative Cracks (Sq. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	100.0	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0	100.0
100-125	100.0	100.0	100.0	100.0	100.0	100.0
125-150	100.0	100.0	100.0	100.0	100.0	100.0
150-175	100.0	100.0	100.0	100.0	100.0	100.0
175-200	100.0	100.0	100.0	100.0	100.0	100.0
200-225	100.0	100.0	100.0	100.0	100.0	100.0
225-250	100.0	100.0	100.0	100.0	100.0	100.0
250-275	100.0	100.0	100.0	100.0	100.0	100.0
Total	1100.0	1100.0	1100.0	1100.0	1100.0	1100.0
Σ y^2	110000	110000	110000	110000	110000	110000
Mean	100.00	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00	0.00
X+2S	100.00	100.00	100.00	100.00	100.00	100.00
X-2S	100.00	100.00	100.00	100.00	100.00	100.00

% Pre-Const.,Relative Cracks (Sq. Ft./Sq. Ft.). Portland Cement Concrete Base **ANOVA.**

ΣΣ y = 13200.0

ΣΣ y^2 = 1320000

CT = 1320000

Source	df	SS	MS	F	F(05)	F(01)
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Section	11	0.0	0.0	#DIV/0!	1.87	2.41
Error	120	0.0	0.0			
Total	131	0.0				

Total Cracks (Sq. Ft.). Soil Cement Base, Summary

Section >	13	14	15	16	17
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0-25	1375	1400	1400	1325	1200
25-50	750	1300	1325	1375	1175
50-75	400	1000	1225	1250	1200
75-100	750	1100	1100	1300	1300
100-135	900	1200	1200	850	1350
Total	4175	6000	6250	6100	6225
Σy^2	3985625	7300000	7866250	7621250	7773125
Mean	835.0	1200.0	1250.0	1220.0	1245.0
SDev (S)	353.4	158.1	115.9	211.7	75.8
2S	706.8	316.2	231.8	423.4	151.7
X + 2S	1541.8	1516.2	1481.8	1643.4	1396.7
X - 2S	128.2	883.8	1018.2	796.6	1093.3

Section >	18	19	20	21	22
---	---	---	---	---	---
0-25	1250	1400	1300	1100	1200
25-50	1300	1300	1250	1225	1250
50-75	1250	1375	1275	1200	1075
75-100	1325	1325	1250	1100	900
100-135	1375	1350	1375	1250	750
Total	6500	6750	6450	5875	5175
Σy^2	8461250	9118750	8331250	6923125	5530625
Mean	1300.0	1350.0	1290.0	1175.0	1035.0
SDev (S)	53.0	39.5	51.8	70.7	208.9
2S	106.1	79.1	103.7	141.4	417.7
X + 2S	1406.1	1429.1	1393.7	1316.4	1452.7
X - 2S	1193.9	1270.9	1186.3	1033.6	617.3

Total Cracks (Sq. Ft.). Soil Cement Base ANOVA.

$\Sigma\Sigma\, y = 59500$
$\Sigma\Sigma\, y\text{^}2 = 7.\ E{+}07$
$CT = 7.\ E{+}07$

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	9	1028000	114222	4.24	2.12	2.89
Error	40	1078250	26956			
Total	49	2106250				

Relative Cracks (Sq. Ft./Sq. Ft.). Soil Cement Base, Summary

Section >	13	14	15	16	17
---	---	---	---	---	---
0-25	0.786	0.800	0.800	0.757	0.686
25-50	0.429	0.743	0.757	0.786	0.671
50-75	0.229	0.571	0.700	0.714	0.686
75-100	0.429	0.629	0.629	0.743	0.743
100-135	0.367	0.490	0.490	0.347	0.551
Total	2.239	3.233	3.376	3.347	3.337
Σy^2	1.172	2.153	2.338	2.373	2.247
Mean	0.4478	0.6465	0.6751	0.6694	0.6673
SDev (S)	0.2058	0.1259	0.1219	0.1821	0.0706
2S	0.4117	0.2517	0.2438	0.3642	0.1412
X + 2S	0.8594	0.8982	0.9189	1.0336	0.8085
X - 2S	0.0361	0.3948	0.4313	0.3052	0.5262

Section >	18	19	20	21	22
---	---	---	---	---	---
0-25	0.714	0.800	0.743	0.629	0.686
25-50	0.743	0.743	0.714	0.700	0.714
50-75	0.714	0.786	0.729	0.686	0.614
75-100	0.757	0.757	0.714	0.629	0.514
100-135	0.561	0.551	0.561	0.510	0.306
Total	3.490	3.637	3.461	3.153	2.835
Σy^2	2.460	2.686	2.418	2.011	1.716
Mean	0.6980	0.7273	0.6922	0.6306	0.5669
SDev (S)	0.0787	0.1011	0.0742	0.0748	0.1650
2S	0.1573	0.2022	0.1484	0.1495	0.3299
X + 2S	0.8553	0.9296	0.8406	0.7801	0.8969
X - 2S	0.5406	0.5251	0.5439	0.4811	0.2370

Relative Cracks (Sq. Ft./Sq. Ft.). Soil Cement Base ANOVA.

$\Sigma\Sigma y = 32.106$
$\Sigma\Sigma y\text{^}2 = 21.574$
$CT = 20.616$

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	9	0.295	0.033	1.97	2.12	2.89
Error	40	0.664	0.017			
Total	49	0.958				

% Pre-Const., Total Cracks (Sq. Ft.). Soil Cement Base, Summary

Section >	13	14	15	16	17
---	---	---	---	---	---
0-25	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0
100-135	100.0	100.0	100.0	100.0	100.0
Total	500.0	500.0	500.0	500.0	500.0
Σy^2	50000.0	50000.0	50000.0	50000.0	50000.0
Mean	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00
X + 2S	100.00	100.00	100.00	100.00	100.00
X - 2S	100.00	100.00	100.00	100.00	100.00

Section >	18	19	20	21	22
---	---	---	---	---	---
0-25	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0
100-135	100.0	100.0	100.0	100.0	100.0
Total	500.0	500.0	500.0	500.0	500.0
Σy^2	50000.0	50000.0	50000.0	50000.0	50000.0
Mean	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00
X + 2S	100.00	100.00	100.00	100.00	100.00
X - 2S	100.00	100.00	100.00	100.00	100.00

% Pre-Const., Total Cracks (Sq. Ft.). Soil Cement Base ANOVA.

$\Sigma\Sigma y$ = 5000.0
$\Sigma\Sigma y$^2 = 500000
CT = 500000

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	9	0.0	0.0	#DIV/0!	2.12	2.89
Error	40	0.0	0.0			
Total	49	0.0				

% Pre-Const., Total Cracks (Sq. Ft.). Soil Cement Base ANOVA.

$\Sigma\Sigma$ y = 5000.0
$\Sigma\Sigma$ y^2 = 500000
CT = 500000

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	9	0.0	0.0	#DIV/0!	2.12	2.89
Error	40	0.0	0.0			
Total	49	0.0				

% Pre-Const., Relative Cracks (Sq. Ft./Sq. Ft..). Soil Cement Base, Summary

Section >	13	14	15	16	17
---	---	---	---	---	---
0-25	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0
100-135	100.0	100.0	100.0	100.0	100.0
Total	500.0	500.0	500.0	500.0	500.0
Σy^2	50000.0	50000.0	50000.0	50000.0	50000.0
Mean	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00
X + 2S	100.00	100.00	100.00	100.00	100.00
X - 2S	100.00	100.00	100.00	100.00	100.00

Section >	18	19	20	21	22
---	---	---	---	---	---
0-25	100.0	100.0	100.0	100.0	100.0
25-50	100.0	100.0	100.0	100.0	100.0
50-75	100.0	100.0	100.0	100.0	100.0
75-100	100.0	100.0	100.0	100.0	100.0
100-135	100.0	100.0	100.0	100.0	100.0
Total	500.0	500.0	500.0	500.0	500.0
Σy^2	50000.0	50000.0	50000.0	50000.0	50000.0
Mean	100.00	100.00	100.00	100.00	100.00
SDev (S)	0.00	0.00	0.00	0.00	0.00
2S	0.00	0.00	0.00	0.00	0.00
X + 2S	100.00	100.00	100.00	100.00	100.00
X - 2S	100.00	100.00	100.00	100.00	100.00

% Pre-Const., Relative Cracks (Sq. Ft./Sq. Ft.). Soil Cement Base ANOVA.

$\Sigma\Sigma$ y = 5000.0
$\Sigma\Sigma$ y^2 = 500000
CT = 500000

Source	df	SS	MS	F	F(05)	F(01)
----	---	---	---	---	---	---
Section	9	0.0	0.0	#DIV/0!	2.12	2.89
Error	40	0.0	0.0			
Total	49	0.0				

Summary of Means (Total and Relative Cracks).

Portland Cement Concrete Base :

Section	Total Lin. Ft.	X + 2S	X - 2S	Relative L.F./Ft^2	X + 2S	X - 2S
1	310.6	467.5	153.8	0.1775	0.2671	0.0879
2	245.1	375.3	114.8	0.1401	0.2145	0.0656
3	90.2	169.5	10.8	0.0515	0.0969	0.0062
4	328.3	502.7	153.9	0.1876	0.2872	0.0879
5	292.0	452.5	131.5	0.1669	0.2586	0.0751
6	266.6	421.5	111.8	0.1524	0.2409	0.0639
7	251.6	352.3	151.0	0.1438	0.2013	0.0863
8	178.5	317.0	40.1	0.1020	0.1811	0.0229
9	266.8	359.4	174.3	0.1525	0.2054	0.0996
10	232.8	311.3	154.3	0.1330	0.1779	0.0882
11	229.0	283.5	174.5	0.1309	0.1620	0.0997
12	199.5	316.0	82.9	0.1140	0.1806	0.0473

Soil Cement Base :

Section	Total Sq. Ft.	X + 2S	X - 2S	Relative Ft^2./Ft^2	X + 2S	X - 2S
13	835.0	1541.8	128.2	0.4478	0.8594	0.0361
14	1200.0	1516.2	883.8	0.6465	0.8982	0.3948
15	1250.0	1481.8	1018.2	0.6751	0.9189	0.4313
16	1220.0	1643.4	796.6	0.6694	1.0336	0.3052
17	1245.0	1396.7	1093.3	0.6673	0.8085	0.5262
18	1300.0	1406.1	1193.9	0.6980	0.8553	0.5406
19	1350.0	1429.1	1270.9	0.7273	0.9296	0.5251
20	1290.0	1393.7	1186.3	0.6922	0.8406	0.5439
21	1175.0	1316.4	1033.6	0.6306	0.7801	0.4811
22	1035.0	1452.7	617.3	0.5669	0.8969	0.2370

Summary of Means (Percent of Pre-Construction).

Portland Cement Concrete Base :

Section	Total % Pre.	X + 2S	X - 2S	Relative % Pre.	X + 2S	X - 2S
1	100.00	100.00	100.00	100.00	100.00	100.00
2	100.00	100.00	100.00	100.00	100.00	100.00
3	100.00	100.00	100.00	100.00	100.00	100.00
4	100.00	100.00	100.00	100.00	100.00	100.00
5	100.00	100.00	100.00	100.00	100.00	100.00
6	100.00	100.00	100.00	100.00	100.00	100.00
7	100.00	100.00	100.00	100.00	100.00	100.00
8	100.00	100.00	100.00	100.00	100.00	100.00
9	100.00	100.00	100.00	100.00	100.00	100.00
10	100.00	100.00	100.00	100.00	100.00	100.00
11	100.00	100.00	100.00	100.00	100.00	100.00
12	100.00	100.00	100.00	100.00	100.00	100.00

Soil Cement Base :

Section	Total Sq. Ft.	X + 2S	X - 2S	Relative Ft^2./Ft^2	X + 2S	X - 2S
13	100.00	100.00	100.00	100.00	100.00	100.00
14	100.00	100.00	100.00	100.00	100.00	100.00
15	100.00	100.00	100.00	100.00	100.00	100.00
16	100.00	100.00	100.00	100.00	100.00	100.00
17	100.00	100.00	100.00	100.00	100.00	100.00
18	100.00	100.00	100.00	100.00	100.00	100.00
19	100.00	100.00	100.00	100.00	100.00	100.00
20	100.00	100.00	100.00	100.00	100.00	100.00
21	100.00	100.00	100.00	100.00	100.00	100.00
22	100.00	100.00	100.00	100.00	100.00	100.00

Portland Cement Concrete Means Data Base :

Total Cracks :

Section	Mean	X + 2S	X - 2S
1	310.6	467.5	153.8
2	245.1	375.3	114.8
3	90.2	169.5	10.8
4	328.3	502.7	153.9
5	292.0	452.5	131.5
6	266.6	421.5	111.8
7	251.6	352.3	151.0
8	178.5	317.0	40.1
9	266.8	359.4	174.3
10	232.8	311.3	154.3
11	229.0	283.5	174.5
12	199.5	316.0	82.9

Relative Cracks :

Section	Mean	X + 2S	X - 2S
1	0.1775	0.2671	0.0879
2	0.1401	0.2145	0.0656
3	0.0515	0.0969	0.0062
4	0.1876	0.2872	0.0879
5	0.1669	0.2586	0.0751
6	0.1524	0.2409	0.0639
7	0.1438	0.2013	0.0863
8	0.1020	0.1811	0.1525
9	0.1525	0.2054	0.0996
10	0.1330	0.1779	0.0882
11	0.1309	0.1620	0.0997
12	0.1140	0.1806	0.0473

% of Pre-Const. Total Cracks :

Section	Mean	X + 2S	X - 2S
1	100.00	100.00	100.00
2	100.00	100.00	100.00
3	100.00	100.00	100.00
4	100.00	100.00	100.00
5	100.00	100.00	100.00
6	100.00	100.00	100.00
7	100.00	100.00	100.00
8	100.00	100.00	100.00
9	100.00	100.00	100.00
10	100.00	100.00	100.00
11	100.00	100.00	100.00
12	100.00	100.00	100.00

% of Pre-Const. Relative Cracks

Section	Mean	X + 2S	X - 2S
1	100.00	100.00	100.00
2	100.00	100.00	100.00
3	100.00	100.00	100.00
4	100.00	100.00	100.00
5	100.00	100.00	100.00
6	100.00	100.00	100.00
7	100.00	100.00	100.00
8	100.00	100.00	100.00
9	100.00	100.00	100.00
10	100.00	100.00	100.00
11	100.00	100.00	100.00
12	100.00	100.00	100.00

Soil Cement Means Data Base :

Total Cracks :

Section	Mean	X + 2S	X - 2S
13	835.0	1541.8	128.2
14	1200.0	1516.2	883.8
15	1250.0	1481.8	1018.2
16	1220.0	1643.4	796.6
17	1245.0	1396.7	1093.3
18	1300.0	1406.1	1193.9
19	1350.0	1429.1	1270.9
20	1290.0	1393.7	1186.3
21	1175.0	1316.4	1033.6
22	1035.0	1452.7	617.3

Relative Cracks :

Section	Mean	X + 2S	X - 2S
13	0.4478	0.8594	0.0361
14	0.6465	0.8982	0.3948
15	0.6751	0.9189	0.4313
16	0.6694	1.0336	0.3052
17	0.6673	0.8085	0.5262
18	0.6980	0.8553	0.5406
19	0.7273	0.9296	0.5251
20	0.6922	0.8406	0.5439
21	0.6306	0.7801	0.4811
22	0.5669	0.8969	0.2370

% of Pre-Const. Total Cracks :

Section	Mean	X + 2S	X - 2S
13	100.00	100.00	100.00
14	100.00	100.00	100.00
15	100.00	100.00	100.00
16	100.00	100.00	100.00
17	100.00	100.00	100.00
18	100.00	100.00	100.00
19	100.00	100.00	100.00
20	100.00	100.00	100.00
21	100.00	100.00	100.00
22	100.00	100.00	100.00

% of Pre-Const. Relative Cracks

Section	Mean	X + 2S	X - 2S
13	100.00	100.00	100.00
14	100.00	100.00	100.00
15	100.00	100.00	100.00
16	100.00	100.00	100.00
17	100.00	100.00	100.00
18	100.00	100.00	100.00
19	100.00	100.00	100.00
20	100.00	100.00	100.00
21	100.00	100.00	100.00
22	100.00	100.00	100.00

Portland Cement Concrete Means Data Base (Manual Paste and Sort) :

Total Cracks :

Section	Mean	X + 2S	X - 2S
4	328.3	502.7	153.9
1	310.6	467.5	153.8
5	292.0	452.5	131.5
9	266.8	359.4	174.3
6	266.6	421.5	111.8
7	251.6	352.3	151.0
2	245.1	375.3	114.8
10	232.8	311.3	154.3
11	229.0	283.5	174.5
12	199.5	316.0	82.9
8	178.5	317.0	40.1
3	90.2	169.5	10.8

Relative Cracks :

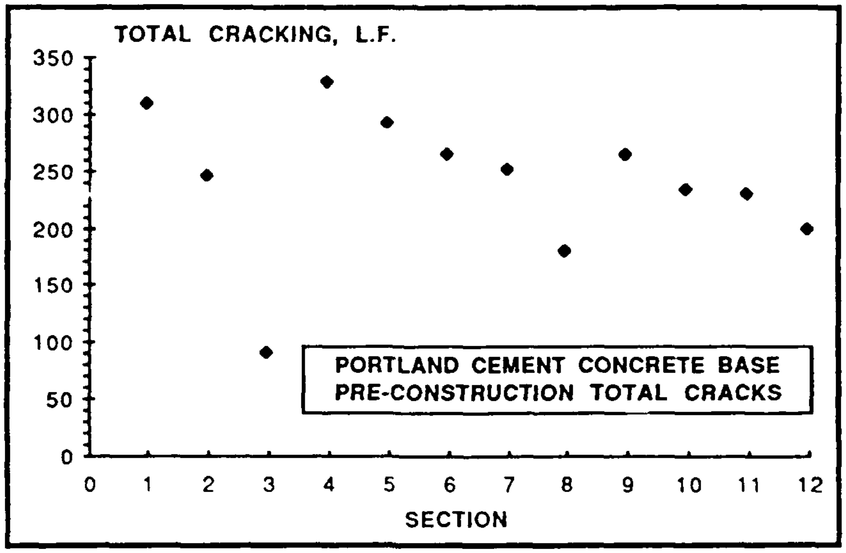
Section	Mean	X + 2S	X - 2S
4	0.1876	0.2872	0.0879
1	0.1775	0.2671	0.0879
5	0.1669	0.2586	0.0751
9	0.1525	0.2054	0.0996
6	0.1524	0.2409	0.0639
7	0.1438	0.2013	0.0863
2	0.1401	0.2145	0.0656
10	0.1330	0.1779	0.0882
11	0.1309	0.1620	0.0997
12	0.1140	0.1806	0.0473
8	0.1020	0.1811	0.1525
3	0.0515	0.0969	0.0062

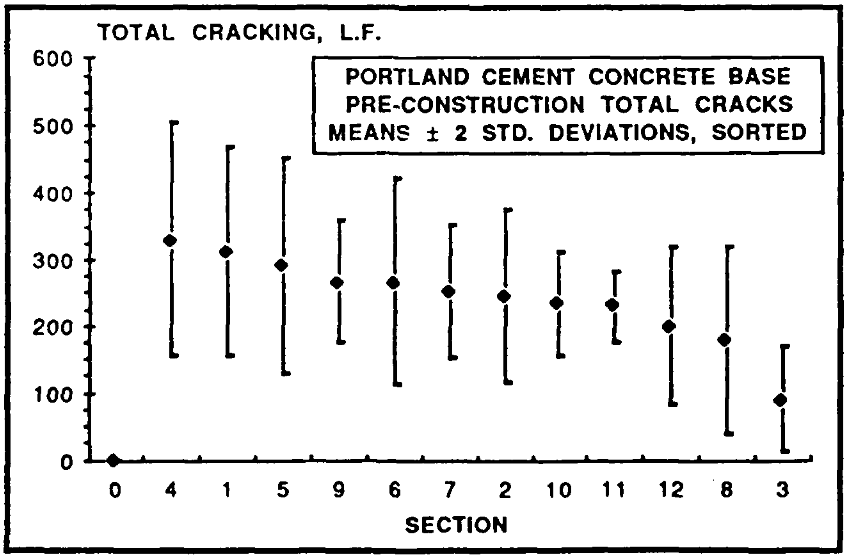
% of Pre-Const. Total Cracks :

Section	Mean	X + 2S	X - 2S
1	100.00	100.00	100.00
2	100.00	100.00	100.00
3	100.00	100.00	100.00
4	100.00	100.00	100.00
5	100.00	100.00	100.00
6	100.00	100.00	100.00
7	100.00	100.00	100.00
8	100.00	100.00	100.00
9	100.00	100.00	100.00
10	100.00	100.00	100.00
11	100.00	100.00	100.00
12	100.00	100.00	100.00

% of Pre-Const. Relative Cracks

Section	Mean	X + 2S	X - 2S
1	100.00	100.00	100.00
2	100.00	100.00	100.00
3	100.00	100.00	100.00
4	100.00	100.00	100.00
5	100.00	100.00	100.00
6	100.00	100.00	100.00
7	100.00	100.00	100.00
8	100.00	100.00	100.00
9	100.00	100.00	100.00
10	100.00	100.00	100.00
11	100.00	100.00	100.00
12	100.00	100.00	100.00





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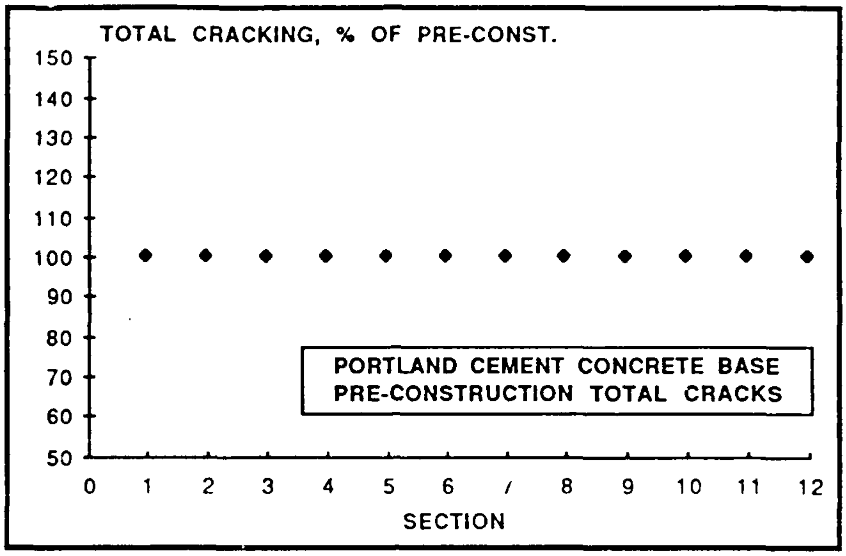
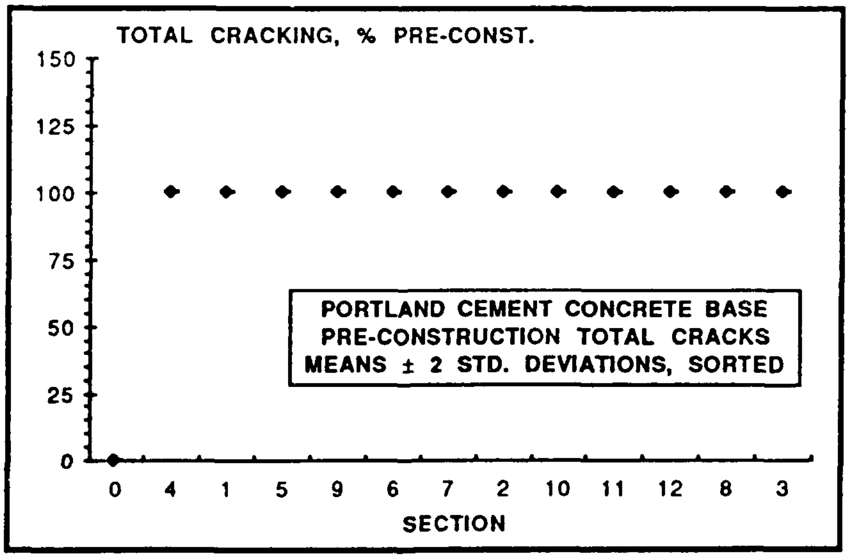
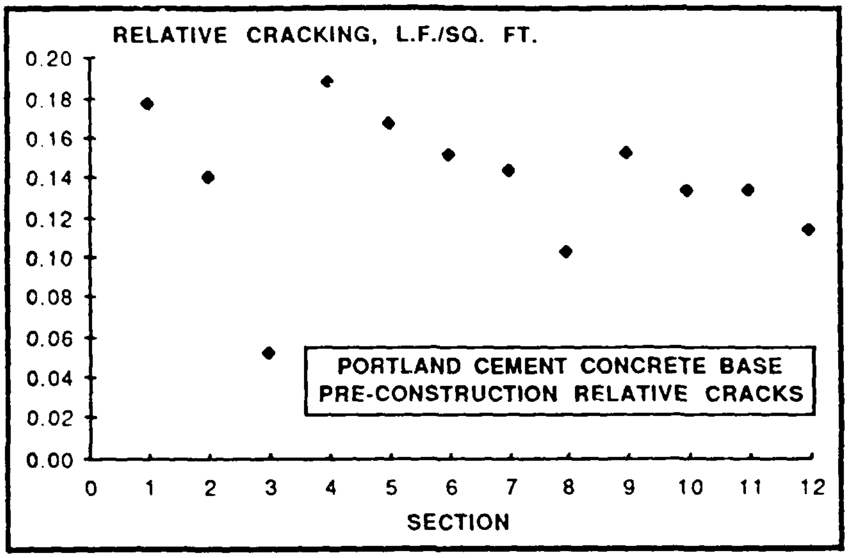
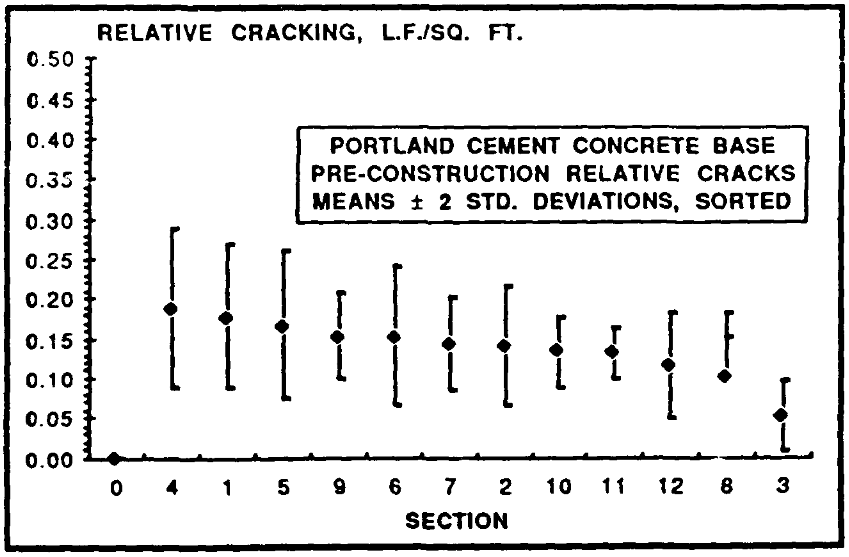
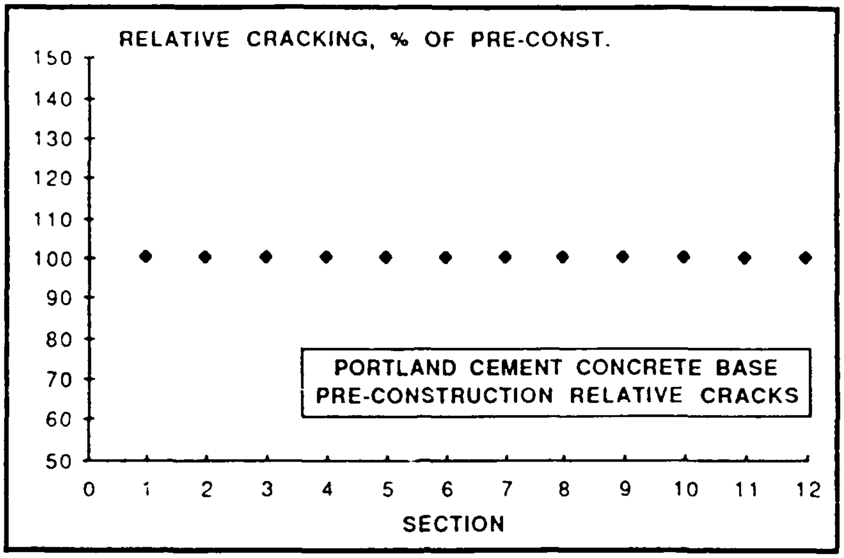

TOTAL CRACKING, % OF PRE-CONST.
150
140
130
120
110
100
90
80
70
60
50
0 1 2 3 4 5 6 / 8 9 10 11 12
SECTION
PORTLAND CEMENT CONCRETE BASE
PRE-CONSTRUCTION TOTAL CRACKS

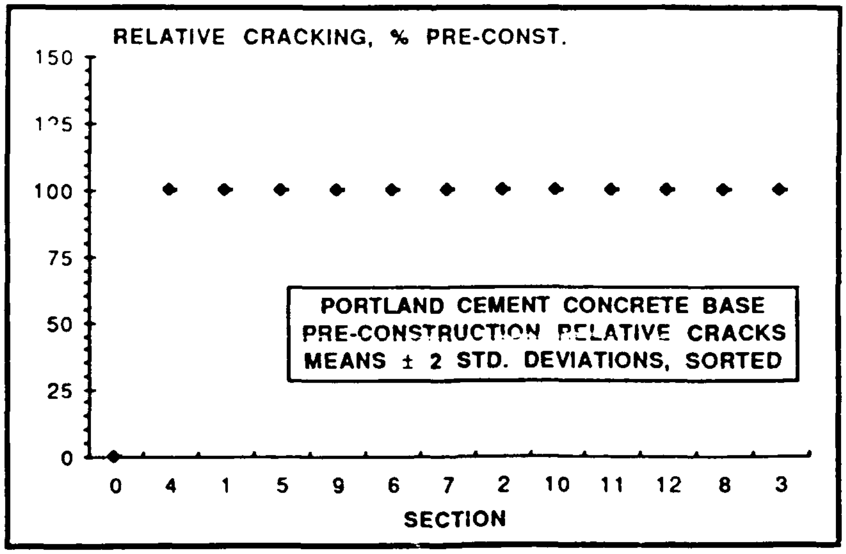

TOTAL CRACKING, % PRE-CONST.
150
125
100
75
50
25
0
0 4 1 5 9 6 7 2 10 11 12 8 3
SECTION
PORTLAND CEMENT CONCRETE BASE
PRE-CONSTRUCTION TOTAL CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED


RELATIVE CRACKING, L.F./SQ. FT.
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12
SECTION
PORTLAND CEMENT CONCRETE BASE
PRE-CONSTRUCTION RELATIVE CRACKS

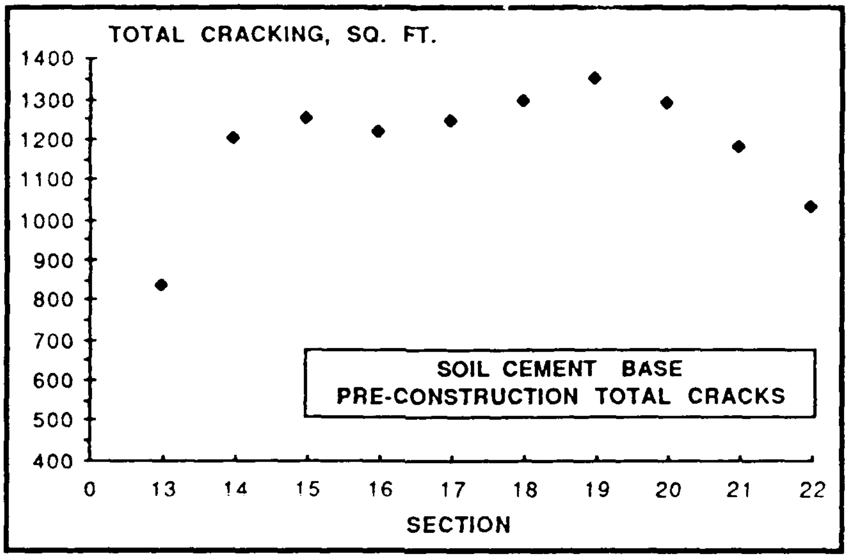

RELATIVE CRACKING, L.F./SQ. FT.
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0 4 1 5 9 6 7 2 10 11 12 8 3
SECTION
PORTLAND CEMENT CONCRETE BASE
PRE-CONSTRUCTION RELATIVE CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED

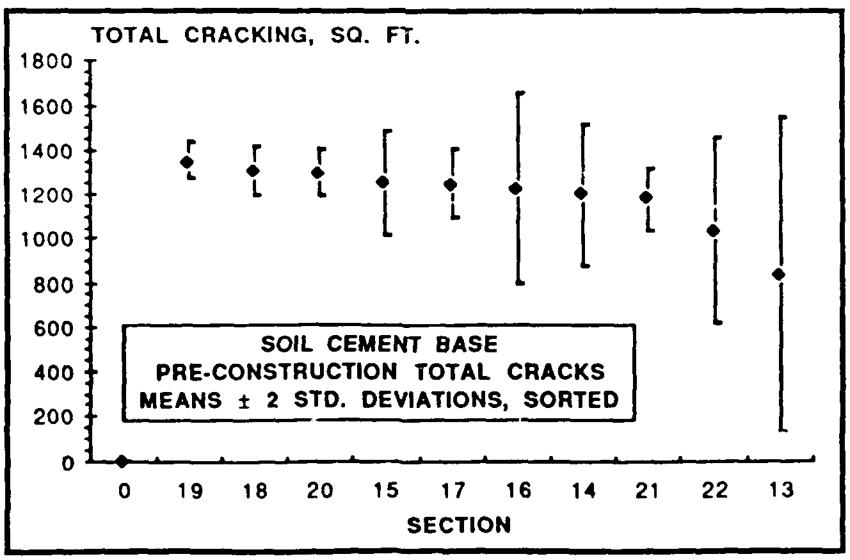


RELATIVE CRACKING, % OF PRE-CONST.
150
140
130
120
110
100
90
80
70
60
50
0
1
2
3
4
5
6
7
8
9
10
11
12
SECTION
PORTLAND CEMENT CONCRETE BASE
PRE-CONSTRUCTION RELATIVE CRACKS



RELATIVE CRACKING, % PRE-CONST.
150
100
75
50
25
0
0
4
1
5
9
6
7
2
10
11
12
8
3
SECTION
PORTLAND CEMENT CONCRETE BASE
MEANS ± 2 STD. DEVIATIONS, SORTED





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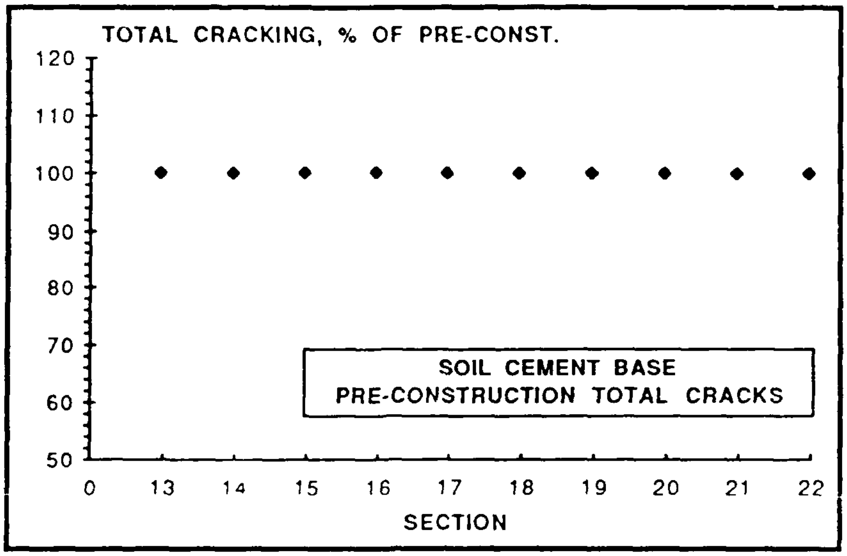
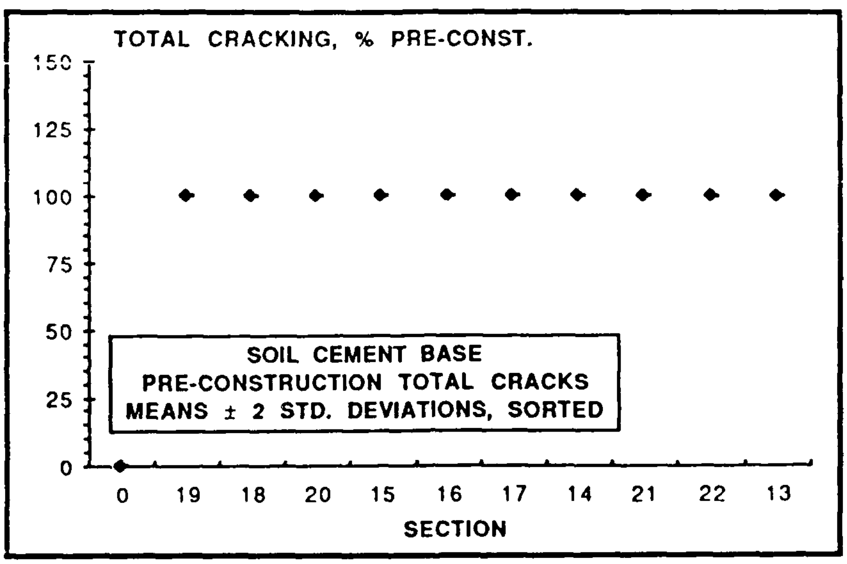
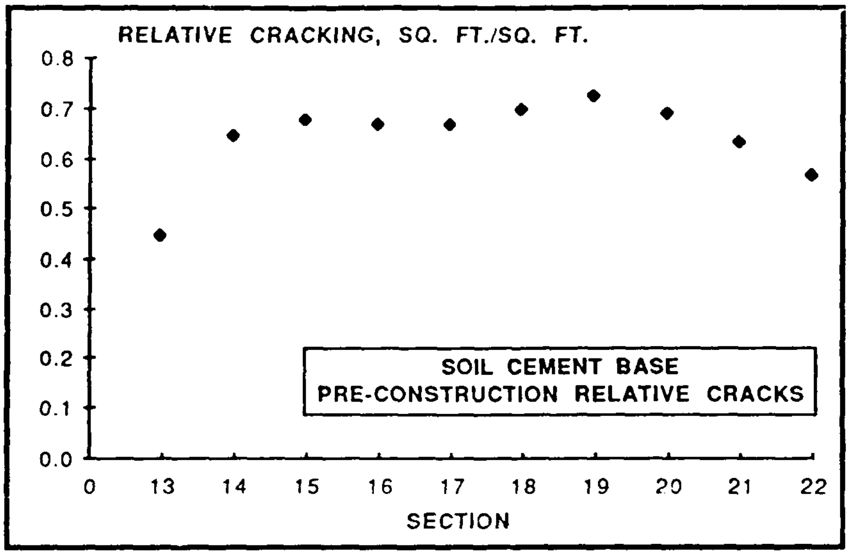
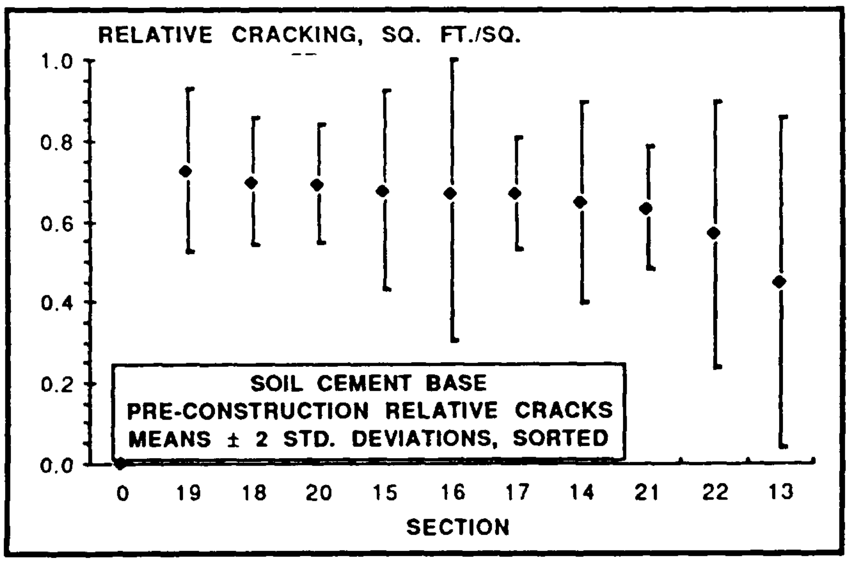
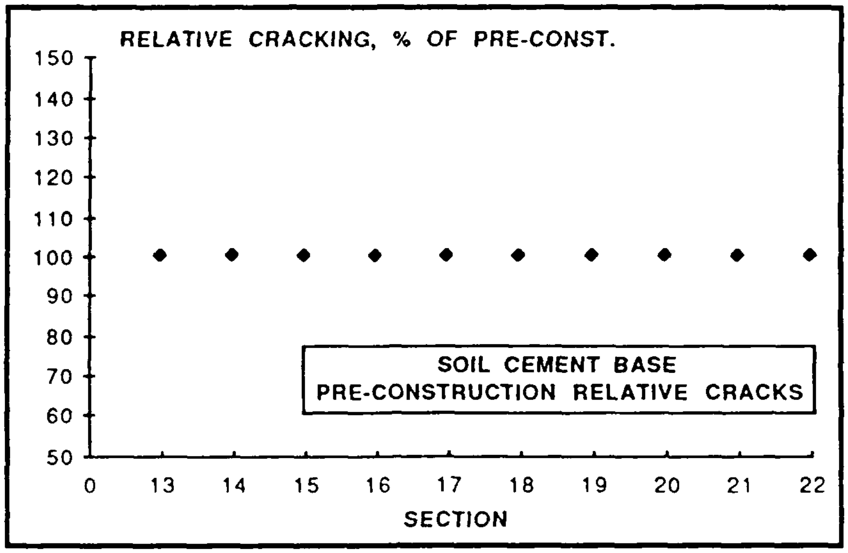
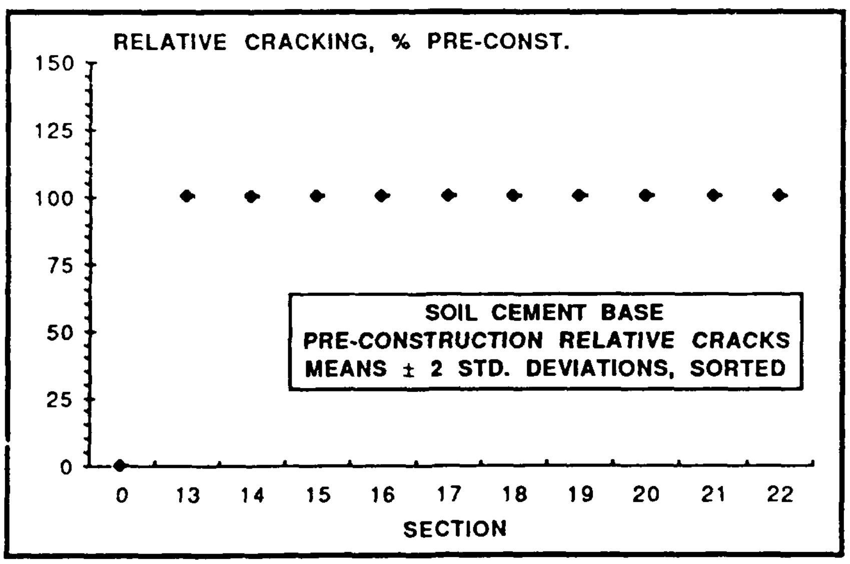

TOTAL CRACKING, % OF PRE-CONST.
120
110
100
90
80
70
60
50
0
13
14
15
16
17
18
19
20
21
22
SECTION
SOIL CEMENT BASE
PRE-CONSTRUCTION TOTAL CRACKS


TOTAL CRACKING, % PRE-CONST.
150
125
100
75
50
25
0
0
19
18
20
15
16
17
14
21
22
13
SECTION
SOIL CEMENT BASE
PRE-CONSTRUCTION TOTAL CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED


RELATIVE CRACKING, SQ. FT./SQ. FT.
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
SOIL CEMENT BASE
PRE-CONSTRUCTION RELATIVE CRACKS
0
13
14
15
16
17
18
19
20
21
22
SECTION


RELATIVE CRACKING, SQ. FT./SQ.
1.0
0.8
0.6
0.4
0.2
0.0
SOIL CEMENT BASE
PRE-CONSTRUCTION RELATIVE CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
0
19
18
20
15
16
17
14
21
22
13
SECTION





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Appendix D

Evaluation No.1, July, 86, Data

Evaluation Date : Evaluation No. 1, July, 86.
Portland Cement Concrete Base.

Section : 1 (A-R)

From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
0	25	341	0	0.0	0.000	0.0
25	50	459	0	0.0	0.000	0.0
50	75	445	0	0.0	0.000	0.0
75	100	321	8	2.5	0.005	2.5
100	125	272	0	0.0	0.000	0.0
125	150	277	5	1.8	0.003	1.8
150	175	234	0	0.0	0.000	0.0
175	200	308	0	0.0	0.000	0.0
200	225	259	0	0.0	0.000	0.0
225	250	219	0	0.0	0.000	0.0
250	275	282	2	0.7	0.001	0.7
Section Totals		3417	15	NA	0.009	NA

Section : 2 (Mod. A-R)

From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
275	300	289	0	0.0	0.000	0.0
300	325	212	0	0.0	0.000	0.0
325	350	292	0	0.0	0.000	0.0
350	375	300	2	0.7	0.001	0.7
375	400	243	0	0.0	0.000	0.0
400	425	336	0	0.0	0.000	0.0
425	450	204	0	0.0	0.000	0.0
450	475	241	0	0.0	0.000	0.0
475	500	285	0	0.0	0.000	0.0
500	525	188	0	0.0	0.000	0.0
525	550	106	0	0.0	0.000	0.0
Section Totals		2696	2	NA	0.001	NA

Section : 3 (Fabric)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
550	575	115	0	0.0	0.000	0.0
575	600	74	0	0.0	0.000	0.0
600	625	57	0	0.0	0.000	0.0
625	650	85	0	0.0	0.000	0.0
650	675	68	0	0.0	0.000	0.0
675	700	89	0	0.0	0.000	0.0
700	725	74	0	0.0	0.000	0.0
725	750	90	0	0.0	0.000	0.0
750	775	57	0	0.0	0.000	0.0
775	800	84	0	0.0	0.000	0.0
800	825	199	0	0.0	0.000	0.0
Section Totals		992	0	NA	0.000	NA

Section : 4 (Control, A.C.)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
825	850	252	0	0.0	0.000	0.0
850	875	299	6	2.0	0.003	2.0
875	900	264	0	0.0	0.000	0.0
900	925	224	0	0.0	0.000	0.0
925	950	284	0	0.0	0.000	0.0
950	975	374	0	0.0	0.000	0.0
975	1000	369	0	0.0	0.000	0.0
1000	1025	304	0	0.0	0.000	0.0
1025	1050	311	0	0.0	0.000	0.0
1050	1075	393	0	0.0	0.000	0.0
1075	1100	537	0	0.0	0.000	0.0
Section Totals		3611	6	NA	0.003	NA

Section : 5 (RFAC)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1100	1125	476	0	0.0	0.000	0.0
1125	1150	215	0	0.0	0.000	0.0
1150	1175	209	16	7.7	0.009	7.7
1175	1200	227	0	0.0	0.000	0.0
1200	1225	250	13	5.2	0.007	5.2
1225	1250	274	0	0.0	0.000	0.0
1250	1275	324	43	13.3	0.025	13.3
1275	1300	228	0	0.0	0.000	0.0
1300	1325	329	0	0.0	0.000	0.0
1325	1350	327	3	0.9	0.002	0.9
1350	1375	353	0	0.0	0.000	0.0
Section Totals		3212	75	NA	0.043	NA

Section : 6 (Sawed)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1375	1400	100	4	4.0	0.002	4.0
1400	1425	200	0	0.0	0.000	0.0
1425	1450	330	0	0.0	0.000	0.0
1450	1475	396	0	0.0	0.000	0.0
1475	1500	311	0	0.0	0.000	0.0
1500	1525	241	0	0.0	0.000	0.0
1525	1550	281	0	0.0	0.000	0.0
1550	1575	247	0	0.0	0.000	0.0
1575	1600	228	0	0.0	0.000	0.0
1600	1625	308	0	0.0	0.000	0.0
1625	1650	291	9	3.1	0.005	3.1
Section Totals		2933	13	NA	0.007	NA

Section : 7 (Sawed)

From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
1650	1675	211	0	0.0	0.000	0.0
1675	1700	315	0	0.0	0.000	0.0
1700	1725	253	0	0.0	0.000	0.0
1725	1750	242	0	0.0	0.000	0.0
1750	1775	221	11	5.0	0.006	5.0
1775	1800	222	0	0.0	0.000	0.0
1800	1825	205	0	0.0	0.000	0.0
1825	1850	234	0	0.0	0.000	0.0
1850	1875	350	4	1.1	0.002	1.1
1875	1900	205	0	0.0	0.000	0.0
1900	1925	310	0	0.0	0.000	0.0
Section Totals		2768	15	NA	0.009	NA

Section : 8 (Fabric)

From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
1925	1950	287	0	0.0	0.000	0.0
1950	1975	213	0	0.0	0.000	0.0
1975	2000	325	0	0.0	0.000	0.0
2000	2025	159	0	0.0	0.000	0.0
2025	2050	123	4	3.3	0.002	3.3
2050	2075	127	0	0.0	0.000	0.0
2075	2100	143	12	8.4	0.007	8.4
2100	2125	112	0	0.0	0.000	0.0
2125	2150	169	9	5.3	0.005	5.3
2150	2175	141	0	0.0	0.000	0.0
2175	2200	165	0	0.0	0.000	0.0
Section Totals		1964	25	NA	0.014	NA

Section : 9 (RFAC)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
2200	2225	347	11	3.2	0.006	3.2
2225	2250	309	0	0.0	0.000	0.0
2250	2275	243	12	4.9	0.007	4.9
2275	2300	284	0	0.0	0.000	0.0
2300	2325	299	0	0.0	0.000	0.0
2325	2350	222	8	3.6	0.005	3.6
2350	2375	260	0	0.0	0.000	0.0
2375	2400	258	11	4.3	0.006	4.3
2400	2425	174	0	0.0	0.000	0.0
2425	2450	286	0	0.0	0.000	0.0
2450	2475	253	8	3.2	0.005	3.2
Section Totals		2935	50	NA	0.029	NA

Section : 10 (A-R)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
2475	2500	183	0	0.0	0.000	0.0
2500	2525	216	0	0.0	0.000	0.0
2525	2550	275	8	2.9	0.005	2.9
2550	2575	211	0	0.0	0.000	0.0
2575	2600	271	0	0.0	0.000	0.0
2600	2625	268	0	0.0	0.000	0.0
2625	2650	179	0	0.0	0.000	0.0
2650	2675	280	9	3.2	0.005	3.2
2675	2700	254	0	0.0	0.000	0.0
2700	2725	187	0	0.0	0.000	0.0
2725	2750	237	0	0.0	0.000	0.0
Section Totals		2561	17	NA	0.010	NA

Section : 11 (Control, A.C.)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
2750	2775	220	0	0.0	0.000	0.0
2775	2800	201	20	10.0	0.011	10.0
2800	2825	233	0	0.0	0.000	0.0
2825	2850	265	0	0.0	0.000	0.0
2850	2875	197	0	0.0	0.000	0.0
2875	2900	244	20	8.2	0.011	8.2
2900	2925	245	0	0.0	0.000	0.0
2925	2950	202	0	0.0	0.000	0.0
2950	2975	269	20	7.4	0.011	7.4
2975	3000	247	0	0.0	0.000	0.0
3000	3025	196	0	0.0	0.000	0.0
Section Totals		2519	60	NA	0.034	NA

Section : 12 (Mod. A-R)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
3025	3050	223	3	1.3	0.002	1.3
3050	3075	249	0	0.0	0.000	0.0
3075	3100	218	0	0.0	0.000	0.0
3100	3125	297	14	4.7	0.008	4.7
3125	3150	237	0	0.0	0.000	0.0
3150	3175	170	0	0.0	0.000	0.0
3175	3200	227	0	0.0	0.000	0.0
3200	3225	150	0	0.0	0.000	0.0
3225	3250	83	0	0.0	0.000	0.0
3250	3275	183	9	4.9	0.005	4.9
3275	3300	157	0	0.0	0.000	0.0
Section Totals		2194	26	NA	0.015	NA

Soil Cement Base. Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.

Section : 13 (A-R)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	**Meas. Tot.**	**Calc. Tot.**	**Meas. Rel.**	**Calc. Rel.**
From	**To**	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
3300	3325	1375	0	NA	NA	NA
3325	3350	750	0	NA	NA	NA
3350	3375	400	6	NA	NA	NA
3375	3400	750	0	NA	NA	NA
3400	3435	900	6	NA	NA	NA
Section Totals		4175	12	NA	NA	NA

Section : 14 (Control, A.		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	**Meas. Tot.**	**Calc. Tot.**	**Meas. Rel.**	**Calc. Rel.**
From	**To**	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
3435	3460	1400	0	NA	NA	NA
3460	3485	1300	0	NA	NA	NA
3485	3510	1000	9	NA	NA	NA
3510	3535	1100	0	NA	NA	NA
3535	3570	1200	6	NA	NA	NA
Section Totals		6000	15	NA	NA	NA

Section : 15 (RFAC)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre- Const.	**Meas. Tot.**	**Calc. Tot.**	**Meas. Rel.**	**Calc. Rel.**
From	**To**	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
3570	3595	1400	0	NA	NA	NA
3595	3620	1325	0	NA	NA	NA
3620	3645	1225	7	NA	NA	NA
3645	3670	1100	0	NA	NA	NA
3670	3705	1200	0	NA	NA	NA
Section Totals		6250	7	NA	NA	NA

Section : 16 (FABRIC)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3705	3730	1325	0	NA	NA	NA
3730	3755	1375	8	NA	NA	NA
3755	3780	1250	0	NA	NA	NA
3780	3805	1300	0	NA	NA	NA
3805	3840	850	0	NA	NA	NA
Section Totals		6100	8	NA	NA	NA

Section : 17 (Mod. A-R)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3840	3865	1200	0	NA	NA	NA
3865	3890	1175	0	NA	NA	NA
3890	3915	1200	0	NA	NA	NA
3915	3940	1300	0	NA	NA	NA
3940	3975	1350	20	NA	NA	NA
Section Totals		6225	20	NA	NA	NA

Section : 18 (A-R)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3975	4000	1250	0	NA	NA	NA
4000	4025	1300	0	NA	NA	NA
4025	4050	1250	0	NA	NA	NA
4050	4075	1325	0	NA	NA	NA
4075	4110	1375	7	NA	NA	NA
Section Totals		6500	7	NA	NA	NA

Section : 19 (Control A.(		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4110	4135	1400	6	NA	NA	NA
4135	4160	1300	0	NA	NA	NA
4160	4185	1375	0	NA	NA	NA
4185	4210	1325	0	NA	NA	NA
4210	4245	1350	9	NA	NA	NA
Section Totals		6750	15	NA	NA	NA

Section : 20 (Fabric)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4245	4270	1300	0	NA	NA	NA
4270	4295	1250	10	NA	NA	NA
4295	4320	1275	0	NA	NA	NA
4320	4345	1250	0	NA	NA	NA
4345	4380	1375	0	NA	NA	NA
Section Totals		6450	10	NA	NA	NA

Section : 21 (Mod A-R)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4380	4405	1100	0	NA	NA	NA
4405	4430	1225	0	NA	NA	NA
4430	4455	1200	0	NA	NA	NA
4455	4480	1100	0	NA	NA	NA
4480	4515	1250	0	NA	NA	NA
Section Totals		5875	0	NA	NA	NA

Section : 22 (RFAC)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	**Meas. Tot.**	**Calc. Tot.**	**Meas. Rel.**	**Calc. Rel.**
From	**To**	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4515	4540	1200	16	NA	NA	NA
4540	4565	1250	0	NA	NA	NA
4565	4590	1075	0	NA	NA	NA
4590	4615	900	14	NA	NA	NA
4615	4650	750	0	NA	NA	NA
Section Totals		5175	30	NA	NA	NA

Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary

Section >	1	2	3	4	5	6
0-25	0	0	0	0	0	4
25-50	0	0	0	6	0	0
50-75	0	0	0	0	16	0
75-100	8	2	0	0	0	0
100-125	0	0	0	0	13	0
125-150	5	0	0	0	0	0
150-175	0	0	0	0	43	0
175-200	0	0	0	0	0	0
200-225	0	0	0	0	0	0
225-250	0	0	0	0	3	0
250-275	2	0	0	0	0	9
Total	15	2	0	6	75	13
Σ y^2	93	4	0	36	2283	97
Mean	1.4	0.2	0.0	0.5	6.8	1.2
SDev (S)	2.7	0.6	0.0	1.8	13.3	2.9
2S	5.4	1.2	0.0	3.6	26.6	5.7
X+2S	6.8	1.4	0.0	4.2	33.4	6.9
X-2S	-4.0	-1.0	0.0	-3.1	-19.8	-4.5

Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary, Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	0	0	11	0	0	3
25-50	0	0	0	0	20	0
50-75	0	0	12	8	0	0
75-100	0	0	0	0	0	14
100-125	11	4	0	0	0	0
125-150	0	0	8	0	20	0
150-175	0	12	0	0	0	0
175-200	0	0	11	9	0	0
200-225	4	9	0	0	20	0
225-250	0	0	0	0	0	9
250-275	0	0	8	0	0	0

Total	15	25	50	17	60	26
Σ y^2	137	241	514	145	1200	286
Mean	1.4	2.3	4.5	1.5	5.5	2.4
SDev (S)	3.4	4.3	5.4	3.4	9.3	4.7
2S	6.8	8.6	10.7	6.9	18.7	9.5
X+2S	8.2	10.9	15.3	8.4	24.1	11.8
X-2S	-5.5	-6.3	-6.2	-5.3	-13.2	-7.1

Total Cracks (Lin. Ft.). Portland Cement Concrete Base ANOVA :

$\Sigma\Sigma$ y = 304

$\Sigma\Sigma$ y^2 = 5036

CT = 700

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	570	52	1.65	1.87	2.41
Error	120	3766	31			
Total	131	4336				

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary.

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	0.000	0.000	0.000	0.000	0.000	0.002
25-50	0.000	0.000	0.000	0.003	0.000	0.000
50-75	0.000	0.000	0.000	0.000	0.009	0.000
75-100	0.005	0.001	0.000	0.000	0.000	0.000
100-125	0.000	0.000	0.000	0.000	0.007	0.000
125-150	0.003	0.000	0.000	0.000	0.000	0.000
150-175	0.000	0.000	0.000	0.000	0.025	0.000
175-200	0.000	0.000	0.000	0.000	0.000	0.000
200-225	0.000	0.000	0.000	0.000	0.000	0.000
225-250	0.000	0.000	0.000	0.000	0.002	0.000
250-275	0.001	0.000	0.000	0.000	0.000	0.005
Total	0.009	0.001	0.000	0.003	0.043	0.007
Σ y^2	0.000	0.000	0.000	0.000	0.001	0.000
Mean	0.0008	0.0001	0.0000	0.0003	0.0039	0.0007
SDev (S)	0.0015	0.0003	0.0000	0.0010	0.0076	0.0016
2S	0.0031	0.0007	0.0000	0.0021	0.0152	0.0033
X+2S	0.0039	0.0008	0.0000	0.0024	0.0191	0.0039
X-2S	-0.0023	-0.0006	0.0000	-0.0018	-0.0113	-0.0026

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary, Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	0.000	0.000	0.006	0.000	0.000	0.002
25-50	0.000	0.000	0.000	0.000	0.011	0.000
50-75	0.000	0.000	0.007	0.005	0.000	0.000
75-100	0.000	0.000	0.000	0.000	0.000	0.008
100-125	0.006	0.002	0.000	0.000	0.000	0.000
125-150	0.000	0.000	0.005	0.000	0.011	0.000
150-175	0.000	0.007	0.000	0.000	0.000	0.000
175-200	0.000	0.000	0.006	0.005	0.000	0.000
200-225	0.002	0.005	0.000	0.000	0.011	0.000
225-250	0.000	0.000	0.000	0.000	0.000	0.005
250-275	0.000	0.000	0.005	0.000	0.000	0.000

Total	0.009	0.014	0.029	0.010	0.034	0.015
Σ y^2	0.000	0.000	0.000	0.000	0.000	0.000
Mean	0.0008	0.0013	0.0026	0.0009	0.0031	0.0014
SDev (S)	0.0020	0.0025	0.0031	0.0020	0.0053	0.0027
2S	0.0039	0.0049	0.0061	0.0039	0.0107	0.0054
X+2S	0.0047	0.0062	0.0087	0.0048	0.0138	0.0068
X-2S	-0.0031	-0.0036	-0.0035	-0.0031	-0.0076	-0.0041

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base ANOVA :

$\Sigma\Sigma$ y = 0.174

$\Sigma\Sigma$ y^2 = 0.002

CT = 0.000

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	0.000	0.000	1.65	1.87	2.41
Error	120	0.001	0.000			
Total	131	0.001				

% Pre-Const., Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary.

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	0.0	0.0	0.0	0.0	0.0	4.0
25-50	0.0	0.0	0.0	2.0	0.0	0.0
50-75	0.0	0.0	0.0	0.0	7.7	0.0
75-100	2.5	0.7	0.0	0.0	0.0	0.0
100-125	0.0	0.0	0.0	0.0	5.2	0.0
125-150	1.8	0.0	0.0	0.0	0.0	0.0
150-175	0.0	0.0	0.0	0.0	13.3	0.0
175-200	0.0	0.0	0.0	0.0	0.0	0.0
200-225	0.0	0.0	0.0	0.0	0.0	0.0
225-250	0.0	0.0	0.0	0.0	0.9	0.0
250-275	0.7	0.0	0.0	0.0	0.0	3.1

Total	5.0	0.7	0.0	2.0	27.0	7.1
Σ y^2	10	0	0	4	263	26
Mean	0.46	0.06	0.00	0.18	2.46	0.64
SDev (S)	0.88	0.20	0.00	0.61	4.43	1.45
2S	1.75	0.40	0.00	1.21	8.86	2.90
X+2S	2.21	0.46	0.00	1.39	11.32	3.54
X-2S	-1.30	-0.34	0.00	-1.03	-6.40	-2.25

% Pre-Const.,Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary, Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	0.0	0.0	3.2	0.0	0.0	1.3
25-50	0.0	0.0	0.0	0.0	10.0	0.0
50-75	0.0	0.0	4.9	2.9	0.0	0.0
75-100	0.0	0.0	0.0	0.0	0.0	4.7
100-125	5.0	3.3	0.0	0.0	0.0	0.0
125-150	0.0	0.0	3.6	0.0	8.2	0.0
150-175	0.0	8.4	0.0	0.0	0.0	0.0
175-200	0.0	0.0	4.3	3.2	0.0	0.0
200-225	1.1	5.3	0.0	0.0	7.4	0.0
225-250	0.0	0.0	0.0	0.0	0.0	4.9
250-275	0.0	0.0	3.2	0.0	0.0	0.0
Total	6.1	17.0	19.1	6.1	25.6	11.0
Σ y^2	26	109	76	19	221	48
Mean	0.56	1.54	1.74	0.56	2.33	1.00
SDev (S)	1.51	2.88	2.06	1.24	4.02	1.93
2S	3.01	5.77	4.11	2.48	8.05	3.86
X+2S	3.57	7.31	5.85	3.04	10.37	4.86
X-2S	-2.46	-4.23	-2.37	-1.92	-5.72	-2.86

% Pre-Const.,Total Cracks (Lin. Ft.). Portland Cement Concrete Base ANOVA :

ΣΣ y = 126.7

ΣΣ y^2 = 802

CT = 122

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	88.8	8.1	1.64	1.87	2.41
Error	120	591.7	4.9			
Total	131	680.5				

% Pre-Const., Relative Cracks (Sq. Ft./Sq. Ft..). Portland Cement Concrete Base, Summary.

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	0.0	0.0	0.0	0.0	0.0	4.0
25-50	0.0	0.0	0.0	2.0	0.0	0.0
50-75	0.0	0.0	0.0	0.0	7.7	0.0
75-100	2.5	0.7	0.0	0.0	0.0	0.0
100-125	0.0	0.0	0.0	0.0	5.2	0.0
125-150	1.8	0.0	0.0	0.0	0.0	0.0
150-175	0.0	0.0	0.0	0.0	13.3	0.0
175-200	0.0	0.0	0.0	0.0	0.0	0.0
200-225	0.0	0.0	0.0	0.0	0.0	0.0
225-250	0.0	0.0	0.0	0.0	0.9	0.0
250-275	0.7	0.0	0.0	0.0	0.0	3.1
Total	5.0	0.7	0.0	2.0	27.0	7.1
Σ y^2	10	0	0	4	263	26
Mean	0.46	0.06	0.00	0.18	2.46	0.64
SDev (S)	0.88	0.20	0.00	0.61	4.43	1.45
2S	1.75	0.40	0.00	1.21	8.86	2.90
X+2S	2.21	0.46	0.00	1.39	11.32	3.54
X-2S	-1.30	-0.34	0.00	-1.03	-6.40	-2.25

% Pre-Const.,Relative Cracks (Sq. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	0.0	0.0	3.2	0.0	0.0	1.3
25-50	0.0	0.0	0.0	0.0	10.0	0.0
50-75	0.0	0.0	4.9	2.9	0.0	0.0
75-100	0.0	0.0	0.0	0.0	0.0	4.7
100-125	5.0	3.3	0.0	0.0	0.0	0.0
125-150	0.0	0.0	3.6	0.0	8.2	0.0
150-175	0.0	8.4	0.0	0.0	0.0	0.0
175-200	0.0	0.0	4.3	3.2	0.0	0.0
200-225	1.1	5.3	0.0	0.0	7.4	0.0
225-250	0.0	0.0	0.0	0.0	0.0	4.9
250-275	0.0	0.0	3.2	0.0	0.0	0.0
Total	6.1	17.0	19.1	6.1	25.6	11.0
Σ y^2	26	109	76	19	221	48
Mean	0.56	1.54	1.74	0.56	2.33	1.00
SDev (S)	1.51	2.88	2.06	1.24	4.02	1.93
2S	3.01	5.77	4.11	2.48	8.05	3.86
X+2S	3.57	7.31	5.85	3.04	10.37	4.86
X-2S	-2.46	-4.23	-2.37	-1.92	-5.72	-2.86

% Pre-Const.,Relative Cracks (Sq. Ft./Sq. Ft.). PCC Base ANOVA :

ΣΣ y = 126.7

ΣΣ y^2 = 802

CT = 122

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	88.8	8.1	1.64	1.87	2.41
Error	120	591.7	4.9			
Total	131	680.5				

Total Cracks (Lin. Ft.). Soil Cement Base, Summary

Section >	13	14	15	16	17
0-25	0	0	0	0	0
25-50	0	0	0	8	0
50-75	6	9	7	0	0
75-100	0	0	0	0	0
100-135	6	6	0	0	20
Total	12	15	7	8	20
Σy^2	72	117	49	64	400
Mean	2.4	3.0	1.4	1.6	4.0
SDev (S)	3.3	4.2	3.1	3.6	8.9
2S	6.6	8.5	6.3	7.2	17.9
X + 2S	9.0	11.5	7.7	8.8	21.9
X - 2S	-4.2	-5.5	-4.9	-5.6	-13.9

Section >	18	19	20	21	22
0-25	0	6	0	0	16
25-50	0	0	10	0	0
50-75	0	0	0	0	0
75-100	0	0	0	0	14
100-135	7	9	0	0	0
Total	7	15	10	0	30
Σy^2	49	117	100	0	452
Mean	1.4	3.0	2.0	0.0	6.0
SDev (S)	3.1	4.2	4.5	0.0	8.2
2S	6.3	8.5	8.9	0.0	16.5
X + 2S	7.7	11.5	10.9	0.0	22.5
X - 2S	-4.9	-5.5	-6.9	0.0	-10.5

Total Cracks (Lin. Ft.). Soil Cement Base ANOVA.

$\Sigma\Sigma$ y = 124
$\Sigma\Sigma$ y^2 = 1. E+03
CT = 3. E+02

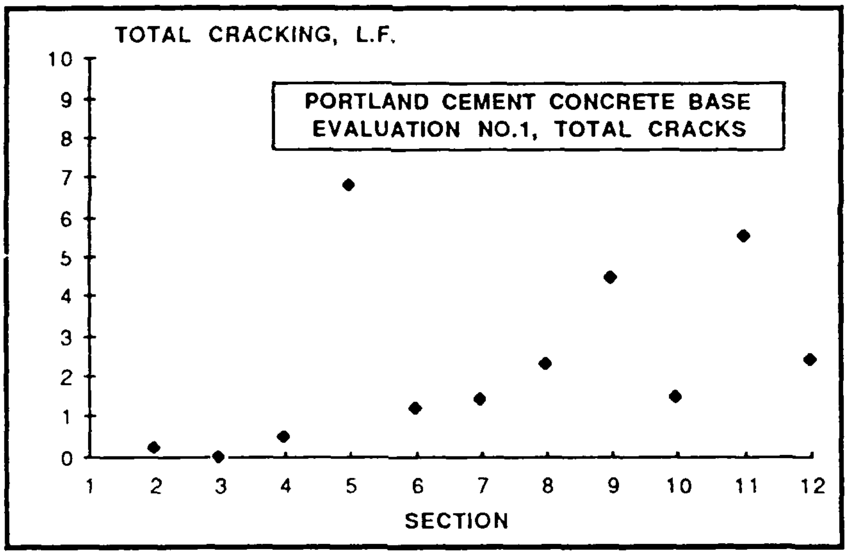
Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	9	124	14	0.56	2.12	2.89
Error	40	989	25			
Total	49	1112				

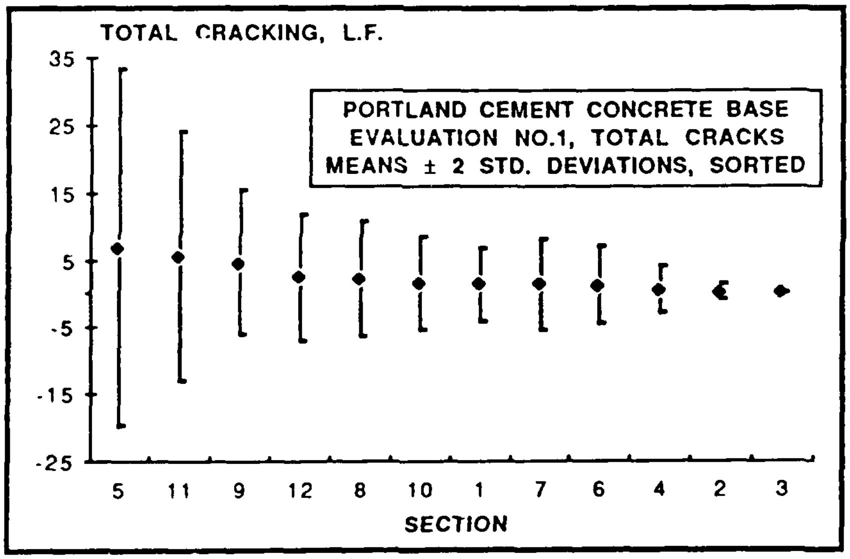
Summary of Means (Total and Relative Cracks).

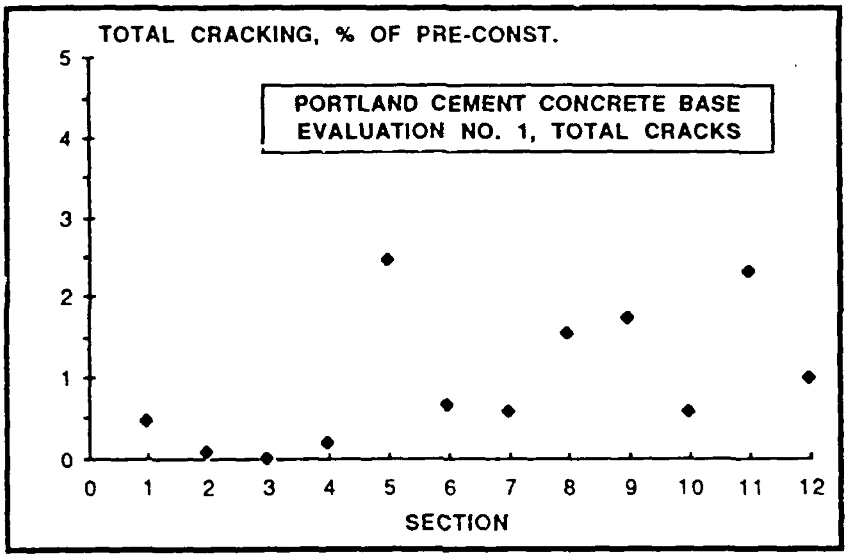
Portland Cement Concrete Base :						
Section	Total Lin. Ft.	X + 2S	X - 2S	Relative L.F./Ft^2	X + 2S	X - 2S
---	---	---	---	---	---	---
1	1.4	6.8	-4.0	0.0008	0.0039	-0.0023
2	0.2	1.4	-1.0	0.0001	0.0008	-0.0006
3	0.0	0.0	0.0	0.0000	0.0000	0.0000
4	0.5	4.2	-3.1	0.0003	0.0024	-0.0018
5	6.8	33.4	-19.8	0.0039	0.0191	-0.0113
6	1.2	6.9	-4.5	0.0007	0.0039	-0.0026
7	1.4	8.2	-5.5	0.0008	0.0047	-0.0031
8	2.3	10.9	-6.3	0.0013	0.0062	-0.0036
9	4.5	15.3	-6.2	0.0026	0.0087	-0.0035
10	1.5	8.4	-5.3	0.0009	0.0048	-0.0031
11	5.5	24.1	-13.2	0.0031	0.0138	-0.0076
12	2.4	11.8	-7.1	0.0014	0.0068	-0.0041

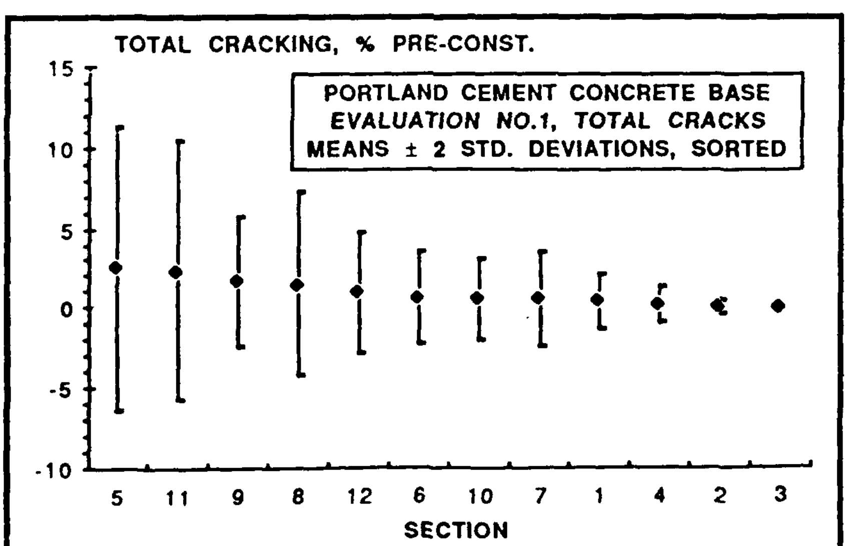
Summary of Means (Percent of Pre-Construction).

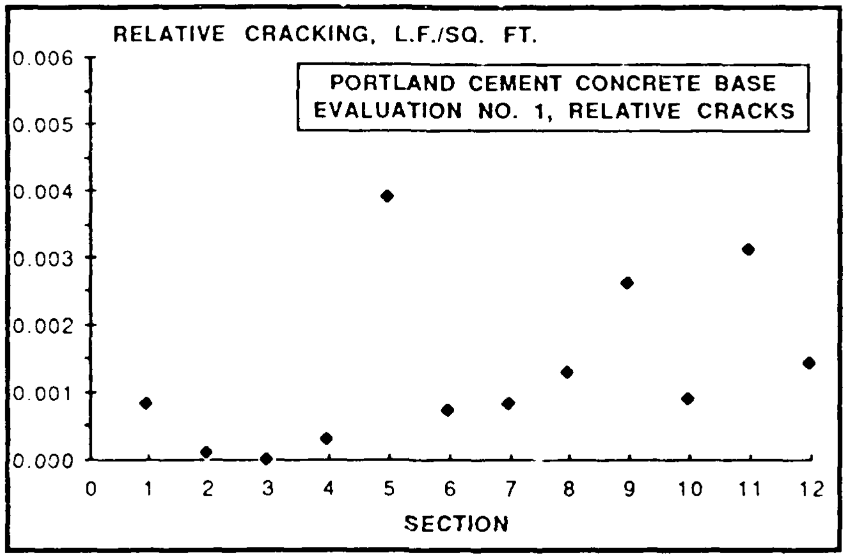
Portland Cement Concrete Base :						
Section	Total % Pre.	X + 2S	X - 2S	Relative % Pre.	X + 2S	X - 2S
---	---	---	---	---	---	---
1	0.46	2.21	-1.30	0.46	2.21	-1.30
2	0.06	0.46	-0.34	0.06	0.46	-0.34
3	0.00	0.00	0.00	0.00	0.00	0.00
4	0.18	1.39	-1.03	0.18	1.39	-1.03
5	2.46	11.32	-6.40	2.46	11.32	-6.40
6	0.64	3.54	-2.25	0.64	3.54	-2.25
7	0.56	3.57	-2.46	0.56	3.57	-2.46
8	1.54	7.31	-4.23	1.54	7.31	-4.23
9	1.74	5.85	-2.37	1.74	5.85	-2.37
10	0.56	3.04	-1.92	0.56	3.04	-1.92
11	2.33	10.37	-5.72	2.33	10.37	-5.72
12	1.00	4.86	-2.86	1.00	4.86	-2.86

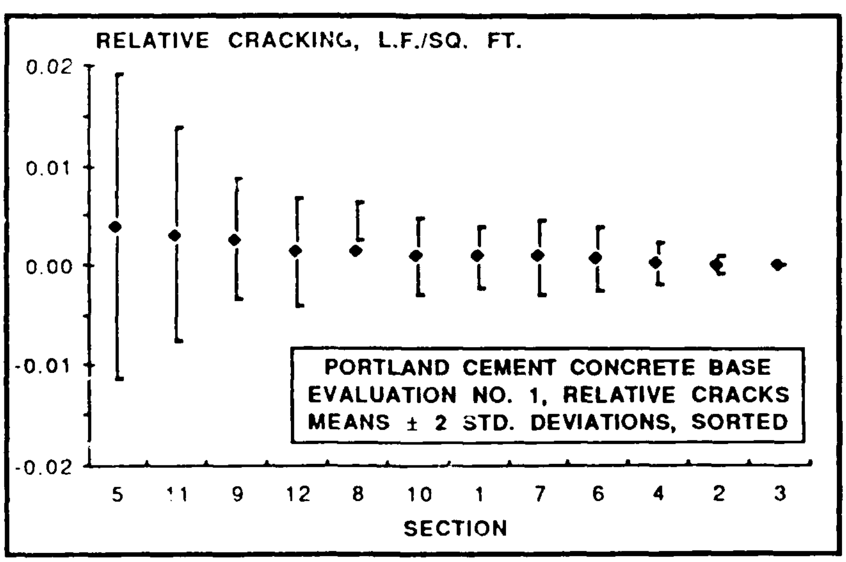

TOTAL CRACKING, L.F.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.1, TOTAL CRACKS
10
9
8
7
6
5
4
3
2
1
0
1 2 3 4 5 6 7 8 9 10 11 12
SECTION

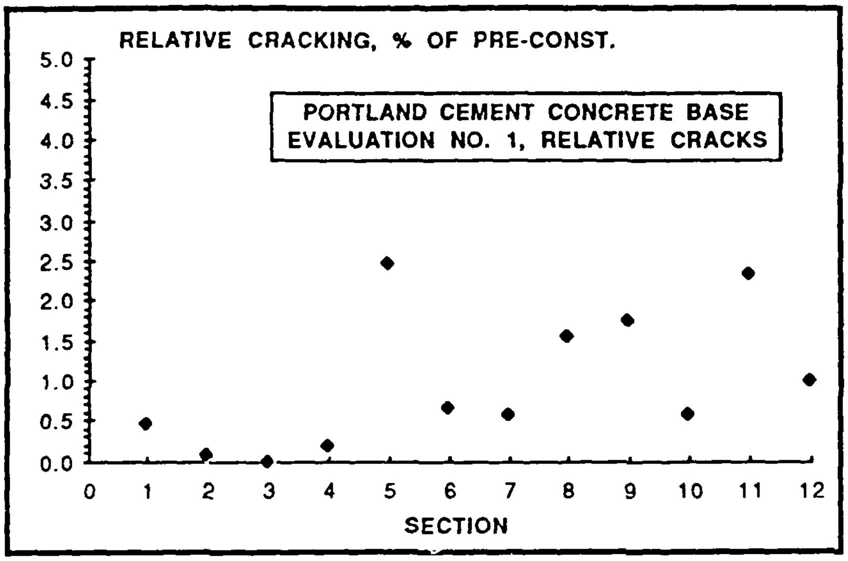

TOTAL CRACKING, L.F.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.1, TOTAL CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
35
25
15
5
-5
-15
-25
5 11 9 12 8 10 1 7 6 4 2 3
SECTION

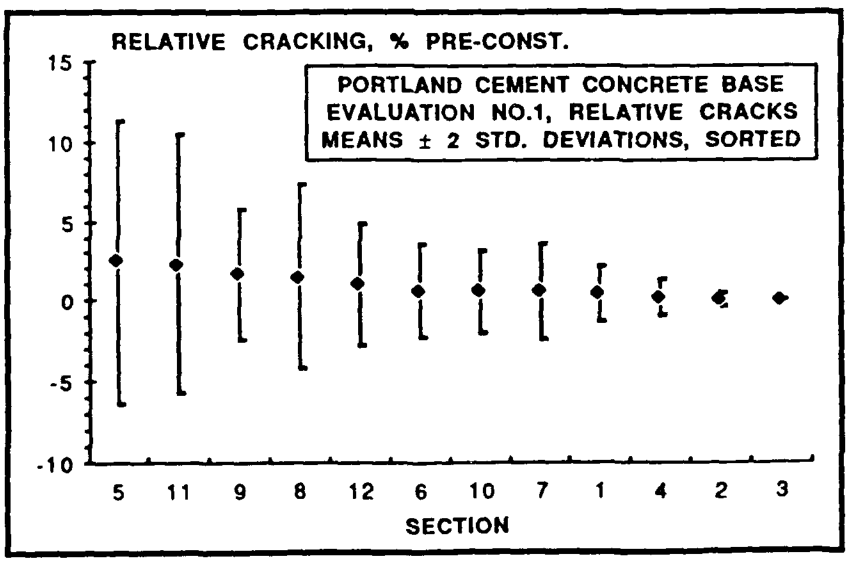

TOTAL CRACKING, % OF PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 1, TOTAL CRACKS
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12
SECTION

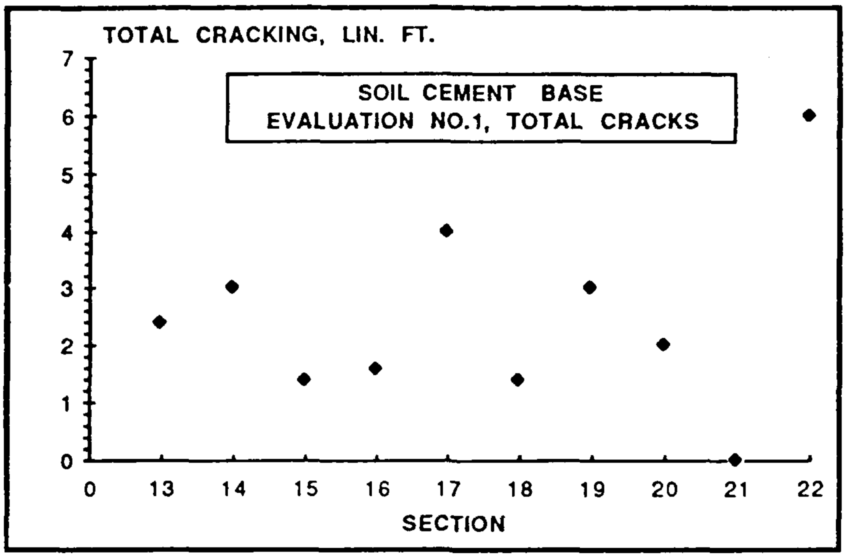

TOTAL CRACKING, % PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.1, TOTAL CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
15
10
5
0
-5
-10
5 11 9 8 12 6 10 7 1 4 2 3
SECTION

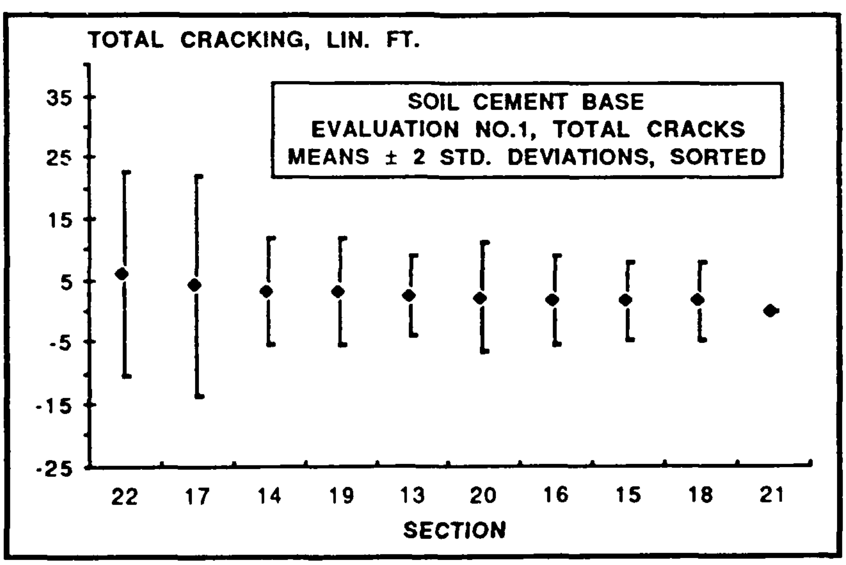

RELATIVE CRACKING, L.F./SQ. FT.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 1, RELATIVE CRACKS
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0 1 2 3 4 5 6 7 8 9 10 11 12
SECTION


RELATIVE CRACKING, L.F./SQ. FT.
0.02
0.01
0.00
-0.01
-0.02
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 1, RELATIVE CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
5 11 9 12 8 10 1 7 6 4 2 3
SECTION


RELATIVE CRACKING, % OF PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 1, RELATIVE CRACKS
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12
SECTION


RELATIVE CRACKING, % PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.1, RELATIVE CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
15
10
5
0
-5
-10
5 11 9 8 12 6 10 7 1 4 2 3
SECTION





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Appendix E

Evaluation No.2, June, 87 Data

Evaluation Date : Evaluation No. 2, June, 87.
Portland Cement Concrete Base.

Section : 1 (A-R)

From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
0	25	341	44	12.9	0.025	12.9
25	50	459	29	6.3	0.017	6.3
50	75	443	16	4.0	0.010	4.0
75	100	321	49	15.3	0.028	15.3
100	125	272	33	12.1	0.019	12.1
125	150	277	21	7.6	0.012	7.6
150	175	234	46	19.7	0.026	19.7
175	200	308	48	15.6	0.027	15.6
200	225	259	25	9.7	0.014	9.7
225	250	219	78	35.6	0.045	35.6
250	275	282	47	16.7	0.027	16.7
Section Totals		3417	[illegible]38	NA	0.250	NA

Section : 2 (Mod. A-R)

From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
275	300	289	25	8.7	0.014	8.7
300	325	212	6	2.8	0.003	2.8
325	350	292	30	10.3	0.017	10.3
350	375	300	41	13.7	0.023	13.7
375	400	243	25	10.3	0.014	10.3
400	425	336	25	7.4	0.014	7.4
425	450	204	46	22.5	0.026	22.5
450	475	241	41	17.0	0.023	17.0
475	500	285	25	8.8	0.014	8.8
500	525	188	39	20.7	0.022	20.7
525	550	106	33	31.1	0.019	31.1
Section Totals		2696	336	NA	0.192	NA

Section : 3 (Fabric)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
550	575	115	91	79.1	0.052	79.1
575	600	74	50	67.6	0.029	67.6
600	625	57	65	114.0	0.037	114.0
625	650	85	104	122.4	0.059	122.4
650	675	68	100	147.1	0.057	147.1
675	700	89	90	101.1	0.051	101.1
700	725	74	150	202.7	0.086	202.7
725	750	90	188	208.9	0.107	208.9
750	775	57	125	219.3	0.071	219.3
775	800	84	60	71.4	0.034	71.4
800	825	199	156	78.4	0.089	78.4
Section Totals		992	1179	NA	0.674	NA

Section : 4 (Control, A.C.)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
825	850	252	27	10.7	0.015	10.7
850	875	299	66	22.1	0.038	22.1
875	900	264	60	22.7	0.034	22.7
900	925	224	50	22.3	0.029	22.3
925	950	284	60	21.1	0.034	21.1
950	975	374	50	13.4	0.029	13.4
975	1000	369	69	18.7	0.039	18.7
1000	1025	304	34	11.2	0.019	11.2
1025	1050	311	60	19.3	0.034	19.3
1050	1075	393	78	19.8	0.045	19.8
1075	1100	537	50	9.3	0.029	9.3
Section Totals		3611	604	NA	0.345	NA

Section : 5 (RFAC)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1100	1125	476	53	11.1	0.030	11.1
1125	1150	215	71	33.0	0.041	33.0
1150	1175	209	136	65.1	0.078	65.1
1175	1200	227	94	41.4	0.054	41.4
1200	1225	250	113	45.2	0.065	45.2
1225	1250	274	121	44.2	0.069	44.2
1250	1275	324	155	47.8	0.089	47.8
1275	1300	228	29	12.7	0.017	12.7
1300	1325	329	65	19.8	0.037	19.8
1325	1350	327	0	0.0	0.000	0.0
1350	1375	353	13	3.7	0.007	3.7
Section Totals		3212	850	NA	0.486	NA

Section : 6 (Sawed)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1375	1400	100	6	6.0	0.003	6.0
1400	1425	200	0	0.0	0.000	0.0
1425	1450	330	0	0.0	0.000	0.0
1450	1475	396	0	0.0	0.000	0.0
1475	1500	311	0	0.0	0.000	0.0
1500	1525	241	0	0.0	0.000	0.0
1525	1550	281	0	0.0	0.000	0.0
1550	1575	247	0	0.0	0.000	0.0
1575	1600	228	0	0.0	0.000	0.0
1600	1625	308	0	0.0	0.000	0.0
1625	1650	291	0	0.0	0.000	0.0
Section Totals		2933	6	NA	0.003	NA

Section : 7 (Sawed)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1650	1675	211	9	4.3	0.005	4.3
1675	1700	315	0	0.0	0.000	0.0
1700	1725	253	0	0.0	0.000	0.0
1725	1750	242	0	0.0	0.000	0.0
1750	1775	221	10	4.5	0.006	4.5
1775	1800	222	0	0.0	0.000	0.0
1800	1825	205	2	1.0	0.001	1.0
1825	1850	234	0	0.0	0.000	0.0
1850	1875	350	0	0.0	0.000	0.0
1875	1900	205	0	0.0	0.000	0.0
1900	1925	310	0	0.0	0.000	0.0
Section Totals		2768	21	NA	0.012	NA

Section : 8 (Fabric)						
From	To	Pre-Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
1925	1950	287	54	18.8	0.031	18.8
1950	1975	213	46	21.6	0.026	21.6
1975	2000	325	53	16.3	0.030	16.3
2000	2025	159	50	31.4	0.029	31.4
2025	2050	123	50	40.7	0.029	40.7
2050	2075	127	53	41.7	0.030	41.7
2075	2100	143	25	17.5	0.014	17.5
2100	2125	112	25	22.3	0.014	22.3
2125	2150	169	53	31.4	0.030	31.4
2150	2175	141	25	17.7	0.014	17.7
2175	2200	165	25	15.2	0.014	15.2
Section Totals		1964	459	NA	0.262	NA

Section : 9 (RFAC)						
From	To	Pre–Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
2200	2225	347	57	16.4	0.033	16.4
2225	2250	309	69	22.3	0.039	22.3
2250	2275	243	102	42.0	0.058	42.0
2275	2300	284	119	41.9	0.068	41.9
2300	2325	299	119	39.8	0.068	39.8
2325	2350	222	123	55.4	0.070	55.4
2350	2375	260	127	48.8	0.073	48.8
2375	2400	258	59	22.9	0.034	22.9
2400	2425	174	56	32.2	0.032	32.2
2425	2450	286	80	28.0	0.046	28.0
2450	2475	253	97	38.3	0.055	38.3
Section Totals		2935	1008	NA	0.576	NA

Section : 10 (A-R)						
From	To	Pre–Const. L.F.	Meas. Tot. L.F.	Calc. Tot. % Pre-Const.	Meas. Rel. L.F./Sq.Ft.	Calc. Rel. % Pre-Const.
---	---	---	---	---	---	---
2475	2500	183	58	31.7	0.033	31.7
2500	2525	216	39	18.1	0.022	18.1
2525	2550	275	72	26.2	0.041	26.2
2550	2575	211	89	42.2	0.051	42.2
2575	2600	271	91	33.6	0.052	33.6
2600	2625	268	82	30.6	0.047	30.6
2625	2650	179	65	36.3	0.037	36.3
2650	2675	280	95	33.9	0.054	33.9
2675	2700	254	75	29.5	0.043	29.5
2700	2725	187	65	34.8	0.037	34.8
2725	2750	237	87	36.7	0.050	36.7
Section Totals		2561	818	NA	0.467	NA

Section : 11 (Control, A.C.)						
		Pre–Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
2750	2775	220	86	39.1	0.049	39.1
2775	2800	201	55	27.4	0.031	27.4
2800	2825	233	35	15.0	0.020	15.0
2825	2850	265	49	18.5	0.028	18.5
2850	2875	197	29	14.7	0.017	14.7
2875	2900	244	49	20.1	0.028	20.1
2900	2925	245	60	24.5	0.034	24.5
2925	2950	202	71	35.1	0.041	35.1
2950	2975	269	52	19.3	0.030	19.3
2975	3000	247	63	25.5	0.036	25.5
3000	3025	196	67	34.2	0.038	34.2
Section	Totals	2519	616	NA	0.352	NA

Section : 12 (Mod. A-R)						
		Pre–Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	L.F.	L.F.	% Pre-Const.	L.F./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3025	3050	223	92	41.3	0.053	41.3
3050	3075	249	60	24.1	0.034	24.1
3075	3100	218	82	37.6	0.047	37.6
3100	3125	297	117	39.4	0.067	39.4
3125	3150	237	84	35.4	0.048	35.4
3150	3175	170	115	67.6	0.066	67.6
3175	3200	227	121	53.3	0.069	53.3
3200	3225	150	130	86.7	0.074	86.7
3225	3250	83	128	154.2	0.073	154.2
3250	3275	183	145	79.2	0.083	79.2
3275	3300	157	125	79.6	0.071	79.6
Section	Totals	2194	1199	NA	0.685	NA

Soil Cement Base. Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.

Section : 13 (A-R)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3300	3325	1375	108	NA	NA	NA
3325	3350	750	137	NA	NA	NA
3350	3375	400	148	NA	NA	NA
3375	3400	750	189	NA	NA	NA
3400	3435	900	161	NA	NA	NA
Section Totals		4175	743	NA	NA	NA

Section : 14 (Control,		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3435	3460	1400	154	NA	NA	NA
3460	3485	1300	140	NA	NA	NA
3485	3510	1000	132	NA	NA	NA
3510	3535	1100	106	NA	NA	NA
3535	3570	1200	135	NA	NA	NA
Section Totals		6000	667	NA	NA	NA

Section : 15 (RFAC)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3570	3595	1400	174	NA	NA	NA
3595	3620	1325	114	NA	NA	NA
3620	3645	1225	195	NA	NA	NA
3645	3670	1100	175	NA	NA	NA
3670	3705	1200	123	NA	NA	NA
Section Totals		6250	781	NA	NA	NA

Section : 16 (FABRIC)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre–Const.	Meas. Tot.	Calc. Tct	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3705	3730	1325	145	NA	NA	NA
3730	3755	1375	154	NA	NA	NA
3755	3780	1250	103	NA	NA	NA
3780	3805	1300	110	NA	NA	NA
3805	3840	850	56	NA	NA	NA
Section	Totals	6100	568	NA	NA	NA

Section : 17 (Mod. A-F		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre- Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3840	3865	1200	135	NA	NA	NA
3865	3890	1175	146	NA	NA	NA
3890	3915	1200	139	NA	NA	NA
3915	3940	1300	113	NA	NA	NA
3940	3975	1350	90	NA	NA	NA
Section	Totals	6225	623	NA	NA	NA

Section : 18 (A-R)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre—Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
3975	4000	1250	159	NA	NA	NA
4000	4025	1300	35	NA	NA	NA
4025	4050	1250	235	NA	NA	NA
4050	4075	1325	168	NA	NA	NA
4075	4110	1375	123	NA	NA	NA
Section	Totals	6500	720	NA	NA	NA

Section : 19 (Control		.Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre–Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	LF.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4110	4135	1400	155	NA	NA	NA
4135	4160	1300	105	NA	NA	NA
4160	4185	1375	160	NA	NA	NA
4185	4210	1325	128	NA	NA	NA
4210	4245	1350	157	NA	NA	NA
Section	Totals	6750	705	NA	NA	NA

Section : 20 (Fabric)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre–Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	LF.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4245	4270	1300	83	NA	NA	NA
4270	4295	1250	159	NA	NA	NA
4295	4320	1275	92	NA	NA	NA
4320	4345	1250	95	NA	NA	NA
4345	4380	1375	193	NA	NA	NA
Section	Totals	6450	622	NA	NA	NA

Section : 21 (Mod A-R)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre–Const.	Meas. Tot.	Calc. Tot.	Meas. Rel.	Calc. Rel.
From	To	Sq. Ft.	LF.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4380	4405	1100	172	NA	NA	NA
4405	4430	1225	145	NA	NA	NA
4430	4455	1200	165	NA	NA	NA
4455	4480	1100	117	NA	NA	NA
4480	4515	1250	97	NA	NA	NA
Section	Totals	5875	696	NA	NA	NA

Section : 22 (RFAC)		Note : Soil Cement Sections have no "areas" affected. Data are in Lin. Ft.				
		Pre-Const.	**Meas. Tot.**	**Calc. Tot.**	**Meas. Rel.**	**Calc. Rel.**
From	**To**	Sq. Ft.	L.F.	% Pre-Const.	Sq./Sq.Ft.	% Pre-Const.
---	---	---	---	---	---	---
4515	4540	1200	121	NA	NA	NA
4540	4565	1250	91	NA	NA	NA
4565	4590	1075	70	NA	NA	NA
4590	4615	900	88	NA	NA	NA
4615	4650	750	34	NA	NA	NA
Section Totals		5175	404	NA	NA	NA

Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	44	25	91	27	53	6
25-50	29	6	50	66	71	0
50-75	18	30	65	60	136	0
75-100	49	41	104	50	94	0
100-125	33	25	100	60	113	0
125-150	21	25	90	50	121	0
150-175	46	46	150	69	155	0
175-200	48	41	188	34	29	0
200-225	25	25	125	60	65	0
225-250	78	39	60	78	0	0
250-275	47	33	156	50	13	0

Total	438	336	1179	604	850	6
Σ y^2	20370	11524	145327	35386	91852	36
Mean	39.8	30.5	107.2	54.9	77.3	0.5
SDev (S)	17.1	11.2	43.5	14.9	51.2	1.8
2S	34.2	22.5	87.1	29.8	102.3	3.6
X+2S	74.1	53.0	194.3	84.7	179.6	4.2
X-2S	5.6	8.1	20.1	25.1	-25.0	-3.1

Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary, Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	9	54	57	58	86	92
25-50	0	46	69	39	55	60
50-75	0	53	102	72	35	82
75-100	0	50	119	89	49	117
100-125	10	50	119	91	29	84
125-150	0	53	123	82	49	115
150-175	2	25	127	65	60	121
175-200	0	25	59	95	71	130
200-225	0	53	56	75	52	128
225-250	0	25	80	65	63	145
250-275	0	25	97	87	67	125
Total	21	459	1008	818	616	1199
Σ y^2	185	20959	100420	63664	37092	137333
Mean	1.9	41.7	91.6	74.4	56.0	109.0
SDev (S)	3.8	13.4	28.4	16.8	16.1	25.8
2S	7.6	26.9	56.7	33.7	32.2	51.5
X+2S	9.5	68.6	148.4	108.0	88.2	160.5
X-2S	-5.7	14.[illegible]	34.9	40.7	23.8	57.5

Total Cracks (Lin. Ft.). Portland Cement Concrete Base ANOVA :

ΣΣ y = 7534

ΣΣ y^2 = 664148

CT = 430009

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	160491	14590	23.77	1.87	2.41
Error	120	73648	614			
Total	131	234139				

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	0.025	0.014	0.052	0.015	0.030	0.003
25-50	0.017	0.003	0.029	0.038	0.041	0.000
50-75	0.010	0.017	0.037	0.034	0.078	0.000
75-100	0.028	0.023	0.059	0.029	0.054	0.000
100-125	0.019	0.014	0.057	0.034	0.065	0.000
125-150	0.012	0.014	0.051	0.029	0.069	0.000
150-175	0.026	0.026	0.086	0.039	0.089	0.000
175-200	0.027	0.023	0.107	0.019	0.017	0.000
200-225	0.014	0.014	0.071	0.034	0.037	0.000
225-250	0.045	0.022	0.034	0.045	0.000	0.000
250-275	0.027	0.019	0.089	0.029	0.007	0.000

Total	0.250	0.192	0.674	0.345	0.486	0.003
Σ y^2	0.007	0.004	0.047	0.012	0.030	0.000
Mean	0.0228	0.0175	0.0612	0.0314	0.0442	0.0003
SDev (S)	0.0098	0.0064	0.0249	0.0085	0.0292	0.0010
2S	0.0196	0.0128	0.0498	0.0170	0.0585	0.0021
X+2S	0.0423	0.0303	0.1110	0.0484	0.1026	0.0024
X-2S	0.0032	0.0046	0.0115	0.0143	-0.0143	-0.0018

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary, Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	0.005	0.031	0.033	0.033	0.049	0.053
25-50	0.000	0.026	0.039	0.022	0.031	0.034
50-75	0.000	0.030	0.058	0.041	0.020	0.047
75-100	0.000	0.029	0.068	0.051	0.028	0.067
100-125	0.006	0.029	0.068	0.052	0.017	0.048
125-150	0.000	0.030	0.070	0.047	0.028	0.066
150-175	0.001	0.014	0.073	0.037	0.034	0.069
175-200	0.000	0.014	0.034	0.054	0.041	0.074
200-225	0.000	0.030	0.032	0.043	0.030	0.073
225-250	0.000	0.014	0.046	0.037	0.036	0.083
250-275	0.000	0.014	0.055	0.050	0.038	0.071
Total	0.012	0.262	0.576	0.467	0.352	0.685
Σ y^2	0.000	0.007	0.033	0.021	0.012	0.045
Mean	0.0011	0.0238	0.0524	0.0425	0.0320	0.0623
SDev (S)	0.0022	0.0077	0.0162	0.0096	0.0092	0.0147
2S	0.0044	0.0154	0.0324	0.0192	0.0184	0.0295
X+2S	0.0054	0.0392	0.0848	0.0617	0.0504	0.0917
X-2S	-0.0033	0.0085	0.0199	0.0233	0.0136	0.0328

Relative Cracks (Lin. Ft./Sq. Ft.). Portland Cement Concrete Base ANOVA :

ΣΣ y = 4.305

ΣΣ y^2 = 0.217

CT = 0.140

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	0.052	0.005	23.77	1.87	2.41
Error	120	0.024	0.000			
Total	131	0.076				

% Pre-Const., Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary.

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	12.9	8.7	79.1	10.7	11.1	6.0
25-50	6.3	2.8	67.6	22.1	33.0	0.0
50-75	4.0	10.3	114.0	22.7	65.1	0.0
75-100	15.3	13.7	122.4	22.3	41.4	0.0
100-125	12.1	10.3	147.1	21.1	45.2	0.0
125-150	7.6	7.4	101.1	13.4	44.2	0.0
150-175	19.7	22.5	202.7	18.7	47.8	0.0
175-200	15.6	17.0	208.9	11.2	12.7	0.0
200-225	9.7	8.8	219.3	19.3	19.8	0.0
225-250	35.6	20.7	71.4	19.8	0.0	0.0
250-275	16.7	31.1	78.4	9.3	3.7	0.0
Total	155.4	153.4	1412.0	190.7	324.0	6.0
Σ y^2	2929	2811	214716	3569	14011	36
Mean	14.13	13.94	128.36	17.33	29.45	0.55
SDev (S)	8.56	8.20	57.85	5.14	21.14	1.81
2S	17.13	16.40	115.71	10.29	42.27	3.62
X+2S	31.26	30.34	244.07	27.62	71.73	4.16
X-2S	-3.00	-2.46	12.65	7.05	-12.82	-3.07

% Pre-Const.,Total Cracks (Lin. Ft.). Portland Cement Concrete Base, Summary, Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	4.3	18.8	16.4	31.7	39.1	41.3
25-50	0.0	21.6	22.3	18.1	27.4	24.1
50-75	0.0	16.3	42.0	26.2	15.0	37.6
75-100	0.0	31.4	41.9	42.2	18.5	39.4
100-125	4.5	40.7	39.8	33.6	14.7	35.4
125-150	0.0	41.7	55.4	30.6	20.1	67.6
150-175	1.0	17.5	48.8	36.3	24.5	53.3
175-200	0.0	22.3	22.9	33.9	35.1	86.7
200-225	0.0	31.4	32.2	29.5	19.3	154.2
225-250	0.0	17.7	28.0	34.8	25.5	79.2
250-275	0.0	15.2	38.3	36.7	34.2	79.6
Total	9.8	274.6	388.0	353.5	273.4	698.5
Σ y^2	40	7801	15137	11756	7492	57834
Mean	0.89	24.96	35.28	32.14	24.86	63.50
SDev (S)	1.76	9.73	12.03	6.28	8.34	36.72
2S	3.52	19.45	24.06	12.56	16.68	73.43
X+2S	4.41	44.41	59.34	44.70	41.54	136.93
X-2S	-2.63	5.51	11.21	19.58	8.18	-9.93

% Pre-Const.,Total Cracks (Lin. Ft.). Portland Cement Concrete Base ANOVA :

$\Sigma\Sigma$ y = 4239.3

$\Sigma\Sigma$ y^2 = 338132

CT = 136148

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	145346.5	13213.3	28.00	1.87	2.41
Error	120	56637.9	472.0			
Total	131	201984.4				

% Pre-Const., Relative Cracks (Sq. Ft./Sq. Ft..). Portland Cement Concrete Base, Summary.

Section >	1	2	3	4	5	6
---	---	---	---	---	---	---
0-25	12.9	8.7	79.1	10.7	11.1	6.0
25-50	6.3	2.8	67.6	22.1	33.0	0.0
50-75	4.0	10.3	114.0	22.7	65.1	0.0
75-100	15.3	13.7	122.4	22.3	41.4	0.0
100-125	12.1	10.3	147.1	21.1	45.2	0.0
125-150	7.6	7.4	101.1	13.4	44.2	0.0
150-175	19.7	22.5	202.7	18.7	47.8	0.0
175-200	15.6	17.0	208.9	11.2	12.7	0.0
200-225	9.7	8.8	219.3	19.3	19.8	0.0
225-250	35.6	20.7	71.4	19.8	0.0	0.0
250-275	16.7	31.1	78.4	9.3	3.7	0.0
Total	155.4	153.4	1412.0	190.7	324.0	6.0
Σ y^2	2929	2811	214716	3569	14011	36
Mean	14.13	13.94	128.36	17.33	29.45	0.55
SDev (S)	8.56	8.20	57.85	5.14	21.14	1.81
2S	17.13	16.40	115.71	10.29	42.27	3.62
X+2S	31.26	30.34	244.07	27.62	71.73	4.16
X-2S	-3.00	-2.46	12.65	7.05	-12.82	-3.07

% Pre-Const.,Relative Cracks (Sq. Ft./Sq. Ft.). Portland Cement Concrete Base, Summary Continued.

Section >	7	8	9	10	11	12
---	---	---	---	---	---	---
0-25	4.3	18.8	16.4	31.7	39.1	41.3
25-50	0.0	21.6	22.3	18.1	27.4	24.1
50-75	0.0	16.3	42.0	26.2	15.0	37.6
75-100	0.0	31.4	41.9	42.2	18.5	39.4
100-125	4.5	40.7	39.8	33.6	14.7	35.4
125-150	0.0	41.7	55.4	30.6	20.1	67.6
150-175	1.0	17.5	48.8	36.3	24.5	53.3
175-200	0.0	22.3	22.9	33.9	35.1	86.7
200-225	0.0	31.4	32.2	29.5	19.3	154.2
225-250	0.0	17.7	28.0	34.8	25.5	79.2
250-275	0.0	15.2	38.3	36.7	34.2	79.6
Total	9.8	274.6	388.0	353.5	273.4	698.5
Σ y^2	40	7801	15137	11756	7492	57834
Mean	0.89	24.96	35.28	32.14	24.86	63.50
SDev (S)	1.76	9.73	12.03	6.28	8.34	36.72
2S	3.52	19.45	24.06	12.56	16.68	73.43
X+2S	4.41	44.41	59.34	44.70	41.54	136.93
X-2S	-2.63	5.51	11.21	19.58	8.18	-9.93

% Pre-Const.,Relative Cracks (Sq. Ft./Sq. Ft.). Portland Cement Conc. Base ANOVA :

$\Sigma\Sigma$ y = 4239.3

$\Sigma\Sigma$ y^2 = 338132

CT = 136148

Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	11	145346.5	13213.3	28.00	1.87	2.41
Error	120	56637.9	472.0			
Total	131	201984.4				

Total Cracks (Lin. Ft.). Soil Cement Base, Summary

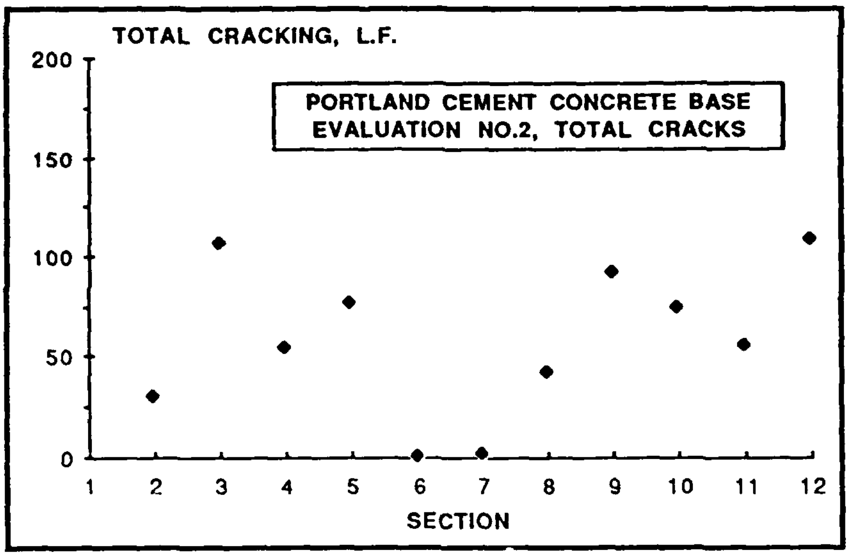
Section >	13	14	15	16	17
---	---	---	---	---	---
0-25	108	154	174	145	135
25-50	137	140	114	154	146
50-75	148	132	195	103	139
75-100	189	106	175	110	113
100-135	161	135	123	56	90
Total	743	667	781	568	623
Σy^2	113979	90201	127051	70586	79731
Mean	148.6	133.4	156.2	113.6	124.6
SDev (S)	29.9	17.5	35.6	38.9	22.9
2S	59.7	35.0	71.1	77.9	45.9
X + 2S	208.3	168.4	227.3	191.5	170.5
X - 2S	88.9	98.4	85.1	35.7	78.7

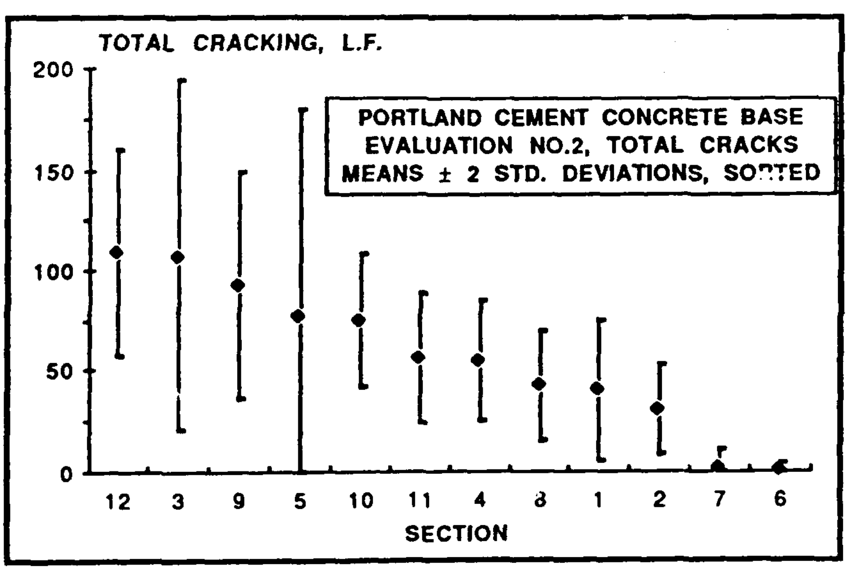
Section >	18	19	20	21	22
---	---	---	---	---	---
0-25	159	155	83	172	121
25-50	35	105	159	145	91
50-75	235	160	92	165	70
75-100	168	128	95	117	88
100-135	123	157	193	97	34
Total	720	705	622	696	404
Σy^2	125084	101683	86908	100932	36722
Mean	144.0	141.0	124.4	139.2	80.8
SDev (S)	73.2	23.9	48.8	31.8	31.9
2S	146.3	47.7	97.6	63.6	63.9
X + 2S	290.3	188.7	222.0	202.8	144.7
X - 2S	-2.3	93.3	26.8	75.6	16.9

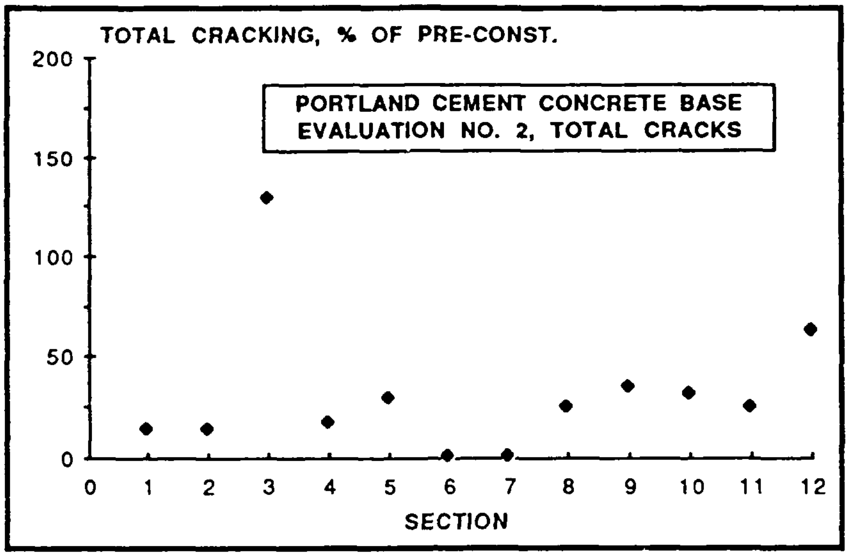
Total Cracks (Lin. Ft.). Soil Cement Base ANOVA.

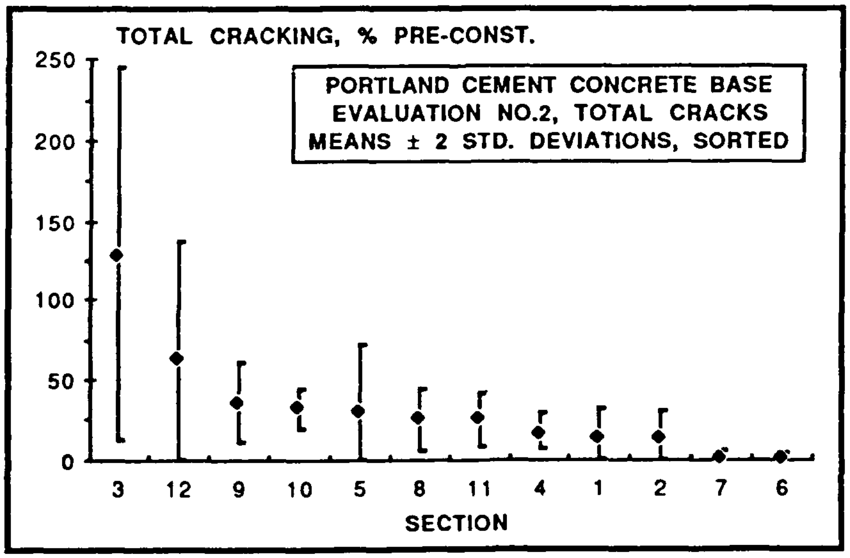
$\Sigma\Sigma$ y = 6529
$\Sigma\Sigma$ y^2 = 9. E+05
CT = 9. E+05

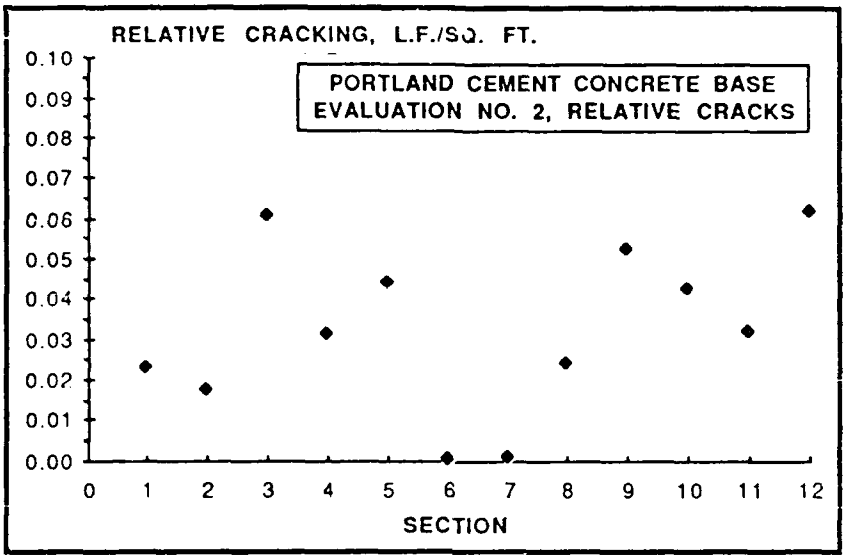
Source	df	SS	MS	F	F(05)	F(01)
---	---	---	---	---	---	---
Section	9	20962	2329	1.57	2.12	2.89
Error	40	59358	1484			
Total	49	80320				

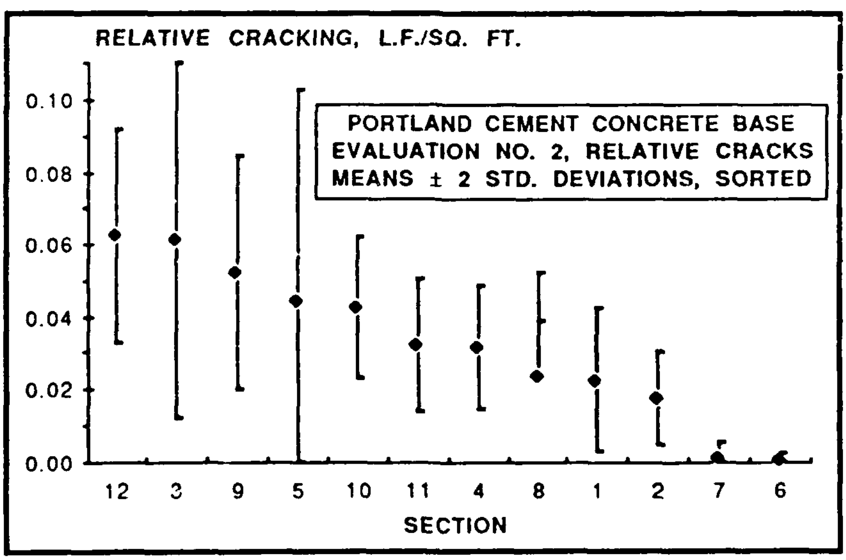

TOTAL CRACKING, L.F.
200
150
100
50
0
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.2, TOTAL CRACKS
1 2 3 4 5 6 7 8 9 10 11 12
SECTION

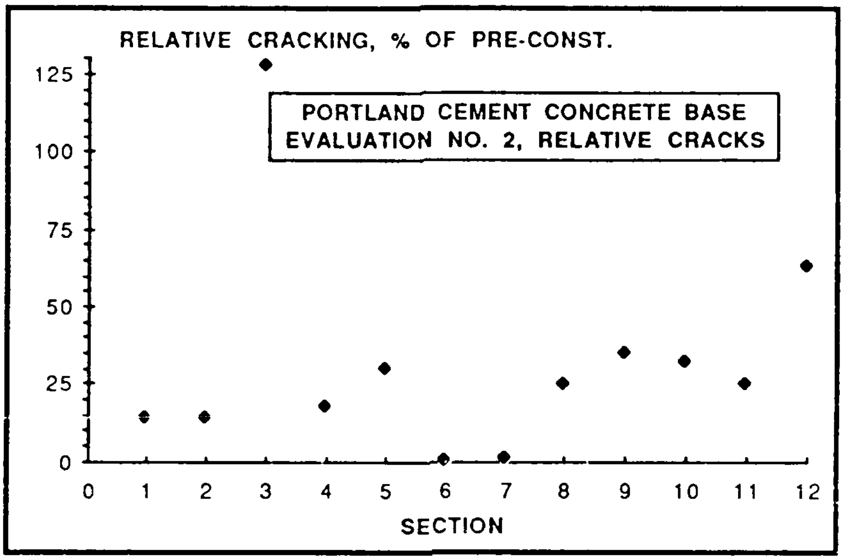

TOTAL CRACKING, L.F.
200
150
100
50
0
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.2, TOTAL CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
12 3 9 5 10 11 4 8 1 2 7 6
SECTION

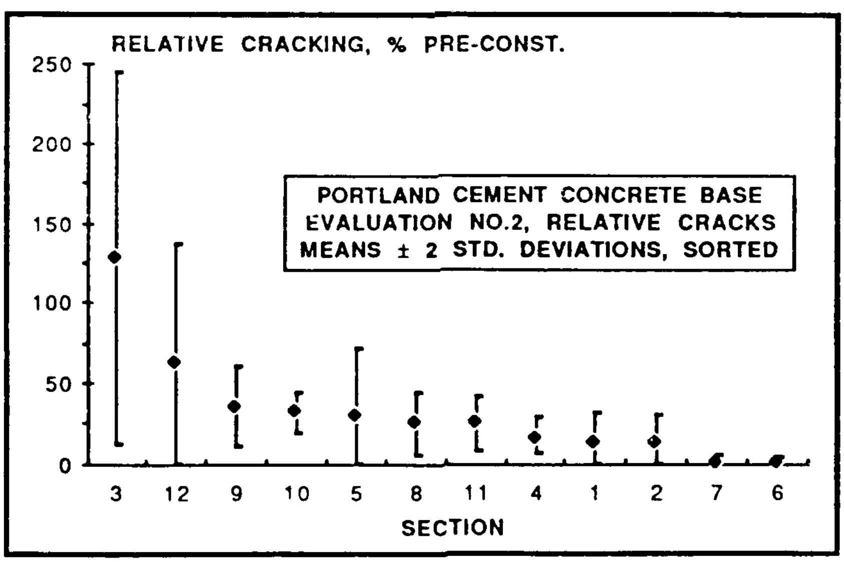

TOTAL CRACKING, % OF PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 2, TOTAL CRACKS
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12
SECTION

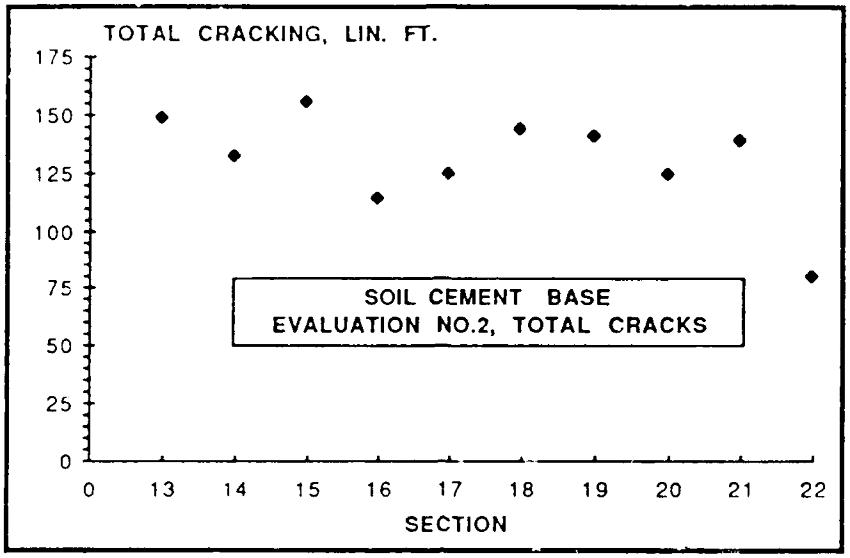

TOTAL CRACKING, % PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.2, TOTAL CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
250
200
150
100
50
0
3 12 9 10 5 8 11 4 1 2 7 6
SECTION

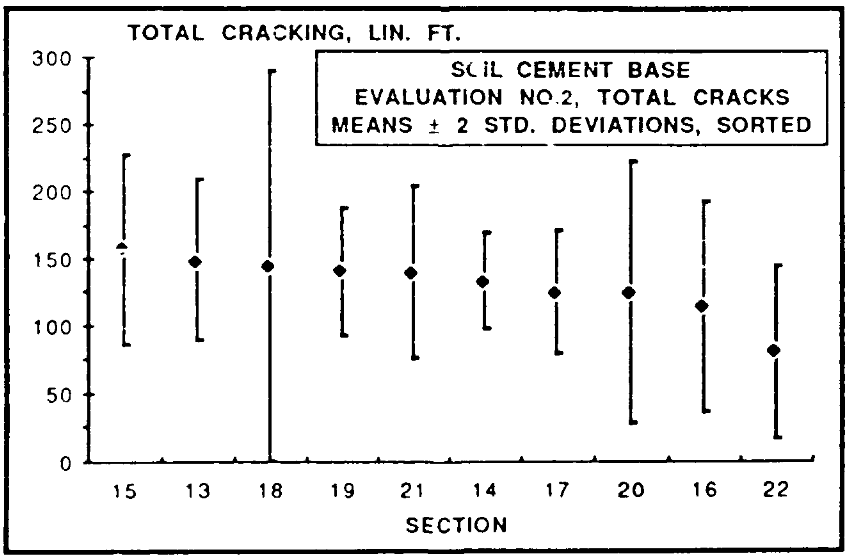

RELATIVE CRACKING, L.F./SQ. FT.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 2, RELATIVE CRACKS
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12
SECTION


RELATIVE CRACKING, L.F./SQ. FT.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 2, RELATIVE CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
0.10
0.08
0.06
0.04
0.02
0.00
12 3 9 5 10 11 4 8 1 2 7 6
SECTION


RELATIVE CRACKING, % OF PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO. 2, RELATIVE CRACKS
125
100
75
50
25
0
0 1 2 3 4 5 6 7 8 9 10 11 12
SECTION


RELATIVE CRACKING, % PRE-CONST.
PORTLAND CEMENT CONCRETE BASE
EVALUATION NO.2, RELATIVE CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED
250
200
150
100
50
0
3 12 9 10 5 8 11 4 1 2 7 6
SECTION


TOTAL CRACKING, LIN. FT.
175
150
125
100
75
50
25
0
0
13
14
15
16
17
18
19
20
21
22
SECTION
SOIL CEMENT BASE
EVALUATION NO.2, TOTAL CRACKS


TOTAL CRACKING, LIN. FT.
300
250
200
150
100
50
0
15
13
18
19
21
14
17
20
16
22
SECTION
SOIL CEMENT BASE
EVALUATION NO.2, TOTAL CRACKS
MEANS ± 2 STD. DEVIATIONS, SORTED

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